Proceedings of the
American Association of Textile Chemists and Colorists

Copyright, 1953, American Association of Textile Chemists and Colorists

Editor of Proceedings: Carl Z Draves, 30 Lahey St, New Hyde Park, N Y

NOVEMBER 9, 1953

National Officers of the Association

President.....J ROBERT BONNAR, General Dyestuff Corporation, 435 Hudson St, New York 14, N Y

Vice President (Western Region).....ARTHUR T BRAINERD, Ciba Co, Inc, 325 W Huron St, Chicago 10, Ill

Vice President (Central Atlantic Region).....ARTHUR W ETCHELLS, Heilwig Dyeing Corp, Delaware Ave & Comly St, Philadelphia, Pa

Vice President (New England Region)....GEORGE O LINBERG, Synthron, Inc, Ashton, R I

Vice President (Southern Region).....SAMUEL L HAYES, Ciba Co, Inc, P O Box 1988, Charlotte 1, N C

Secretary..HAROLD C CHAPIN, Lowell Technological Institute, Lowell, Mass

Treasurer.....ALBERT E SAMPSON, National Aniline Division Allied Chemical & Dye Corp, 150 Causeway St, Boston 14, Mass

Founder.....LOUIS A OLNEY (Deceased)

Chairman of the Executive Committee on Research....LEONARD S LITTLE, 101 West 31st Street, Room 1500, New York 1, N Y

Director of Research....HAROLD W STIEGLER, Lowell Technological Institute, Lowell, Mass

Standing Committees of the Council

Technical Committee on Research.....CHARLES W DORN, *Chairman*
Publicity.....GEORGE H SCHULER, *Chairman*
Conventions.....KENNETH H BARNARD, *Chairman*
Appropriations.....WILLIAM R MOORHOUSE, *Chairman*
Constitution and Bylaws.....HAROLD C CHAPIN, *Chairman*
Membership and Local Sections.....ARTHUR W ETCHELLS, *Chairman*
Corporate Membership.....GEORGE L BAXTER, *Chairman*
Publications.....PERCIVAL THEEL, *Chairman*
Technical Programs.....ELLIOTT MORRILL, *Chairman*

Councilors

Representing Sections

NEW ENGLAND REGION

Northern New England: EDWARD B BELL, ELMER E FICKETT, FRANK J O'NEIL, SAWYER F SYLVESTER
Rhode Island: RAYMOND W JACOBY, THORWALD LARSON, EDWARD W LAWRENCE, ALDEN D NUTE
Western New England: RAYMOND J CAREY

CENTRAL ATLANTIC REGION

Hudson Mohawk: ALBERT E HERRMANN, JR, JOHN J HANLON
New York: CARL H BRUBAKER, CHARLES W DORN, RALPH M FISCHER, WELDON G HELMUS, PATRICK J KENNEDY, JAMES J MARSHALL, HENRY L YOUNG
Philadelphia: CARLETON T ANDERSON, EDWARD C DIEHL, ANGE E RAIMO, ERNEST E RETTBERG, JR, RICHARD B STEHLE, S GRAEME TURNBULL, JR

SOUTHERN REGION

Piedmont: JOSEPH LINDSAY, JR, M M McCANN, RAPHAEL E RUPP, R HOBART SOUTHER, HARLEY Y JENNINGS
South Central: GLENN R BELLAMY
Southeastern: C RUSSELL GILL, H GILLESPIE SMITH
Washington: WALTER M SCOTT

WESTERN REGION

Mid-West: ARTHUR I HULTBERG, SAMUEL KLEIN, ELLIOTT MORRILL
Pacific Northwest: GEORGE S BARKER
Pacific Southwest: ANGUS ROBERTS

Past Presidents

ELVIN H KILLHEFFER, P J WOOD, WILLIAM H CADY, ALBAN EAVENSON, CARL Z DRAVES, THOMAS R SMITH, WILLIAM D APPEL, HENRY F HERRMANN, C NORRIS RABOLD

Local Section Officers

New England Region

NORTHERN NEW ENGLAND

Chairman.....ERNEST R KASWELL, Fabric Research Laboratories, Inc, 665 Boylston St, Boston 16, Mass
Secretary.....AZEL W MACK, Dexter Chemical Corp, 581 Boylston St, Boston 16, Mass
Vice-Chairman—JOHN M GOULD *Treasurer*—WILLIAM W PENNOCK

RHODE ISLAND

Chairman.....ERNEST J CHORNYEI, Bradford Dyeing Association, Westerly, R I
Secretary.....CHARLES F STOKES, Carbic Color and Chemical Co, 87 Weybosset St, Providence, R I
Vice-Chairman—ARTHUR F McLEAN *Treasurer*—J WILLIAM TIMPERLEY

WESTERN NEW ENGLAND

Chairman.....ARTHUR S NYQUIST, American Cyanamid Co, 1937 W Main St, Stamford, Conn
Secretary.....NATHANIEL J GLADE, American Cyanamid Co, 1937 W Main St, Stamford, Conn
Vice Chairman—SOCRATES V VANIOTIS
Treasurer—THOMAS G GILLICK

Central Atlantic Region

HUDSON-MOHAWK

Chairman.....IRWIN J SMITH, Surpass Chemical Co, 1254 Broadway, Albany 1, N Y
Secretary.....WILLIAM A NELSON, Ritter Chemical Company, Inc, 403 W Main St., Amsterdam, N Y
Vice-Chairman—HARVEY GENDREAU *Treasurer*—JOHN W MERRILL

NEW YORK

Chairman.....WELDON G HELMUS, Fair Lawn Finishing Co, Fair Lawn, N J
Secretary.....NORMAN A JOHNSON, American Dyestuff Reporter, 44 East 23rd St, New York 10, N Y
Vice-Chairman—JOHN H HENNESSEY *Treasurer*—GEORGE A JONIC

PHILADELPHIA

Chairman.....HARRY L MORGAN, James Lees & Sons Co, Bridgeport, Pa
Secretary.....THOMAS J SCANLON, Dexter Chemical Corporation, P O Box 657, Springfield, Delaware County, Pa
Vice-Chairman—FREDERICK V TRAUT *Treasurer*—THOMAS H HART

Southern Region

PIEDMONT

Chairman.....HENRY A RUTHERFORD, School of Textiles, N C State College, Raleigh, N C
Secretary.....CLARENCE HOOPER, Burlington Mills Corp, Burlington, N C
Vice-Chairman....H J JORDAN, JR *Treasurer*....C O STEVENSON

SOUTH CENTRAL

Chairman.....EVERETT E BURGNER, JR, Davenport Hosiery Mills, Inc, 400 East 11 St, Chattanooga, Tenn
Secretary....JOSEPH T BOHANNON, JR, American Aniline Products, Inc, 4001 Rossville Blvd, Chattanooga 7, Tenn
Vice-Chairman—PAUL O ANDERSON *Treasurer*—WILLIAM F LUTHER

SOUTHEASTERN

Chairman.....T HOWARD McCAMY, Pepperell Mfg Co, Lindale, Ga
Secretary.....JOHN C COOK, W R C Smith Publishing Co, 806 Peachtree St, N E, Atlanta, Ga
Vice-Chairman.....W B GRIFFIN *Treasurer*.....J W SWINEY

WASHINGTON

Chairman.....MILTON HARRIS, Harris Research Laboratories, 1246 Taylor Ave, N W, Washington 11, D C
Secretary.....GEORGE S BUCK, JR, National Cotton Council of America, 1832 M St, N W, Washington 6, D C
Vice-Chairman—HENRY D BARKER *Treasurer*—HERBERT A EHRMAN

Western Region

MID-WEST

Chairman....ALFRED J OLSON, Phoenix Hosiery Co, 320 E Buffalo St, Milwaukee 1, Wis
Secretary.....VICTOR H LAWRENCE, Geigy Co, Inc. 629 W Washington Blvd, Chicago, Ill
Vice-Chairman—J GORDON SCOTT *Treasurer*—KIRK P FERGUSON

PACIFIC NORTHWEST

Chairman.... (Vacant)
Secretary....THEODORE M MARSHALL, Nyanza Color and Chemical Co, Inc, 115 SW Fourth Ave, Portland 4, Ore
Vice-Chairman—DON ADAMS *Treasurer*—JOHN L AYRES

PACIFIC SOUTHWEST

Chairman.....SIDNEY SPRINGER, 311 South San Pedro St, Los Angeles 13, Calif
Secretary.....CLARICE H LINDSEY, Univ of California, Dept of Home Economics, Los Angeles 24, Calif
Vice-Chairman—ROBERT C ROTH *Treasurer*—SERGIO M DADONE

Student Chapters

BRADFORD DURFEE TECHNICAL INSTITUTE, CLEMSON COLLEGE, FAIRLEIGH DICKINSON COLLEGE, GEORGIA INSTITUTE OF TECHNOLOGY, LOWELL TECHNOLOGICAL INSTITUTE, NEW BEDFORD TEXTILE INSTITUTE, NORTH CAROLINA STATE COLLEGE, PHILADELPHIA TEXTILE INSTITUTE, RHODE ISLAND SCHOOL OF DESIGN, UTICA TECHNICAL INSTITUTE

*AATCC Research Newsletter No. 6

NEWS IN GENERAL

On October 20th, a group of 17 officers and committee personnel met at AATCC headquarters to consider a number of administrative recommendations. A group headed by President J Robert Bonnar later inspected the new quarters soon to be available at Lowell Technological Institute for much needed enlargement of AATCC's research facilities. LTI president Martin J Lydon conducted a tour of the Institute and received the group's commendations for the very fine extension and modernization program he has directed. Mr Lydon expressed his assurance of every co-operation in making available to AATCC research the use of LTI's extensive facilities.

The handbook of rules and obligations of committee chairmen and secretaries entitled "Organization and Functions of AATCC Research Committees" is off the press and is being distributed from the Office of the Chairman of the Technical Committee on Research.

AT RESEARCH HEADQUARTERS

A statistical analysis is being made of the results on dimensional change, which were obtained in interlaboratory trials carried out in the laboratories of United Merchants, J C Penney Co, Burlington Mills, Cluett, Peabody & Co, and AATCC Research. Launderings were made on sixteen unshrunk and preshrunk cotton and rayon fabrics by eight methods.

An additional study of the comparison of domestic laundering in a home-laundry washer and laundering in a rotary washer (as in CCC-T-191A or CCC-T-191B) with commercial laundering is being carried out and is nearing completion. Both reports will be available shortly to the Committee on Dimensional Change of which John F Warner is chairman.

In co-operation with the Special Committee on FTC Water-Repellency Tests, G J Mandikos is continuing the investigation of the effect of moisture conditions on the water repellency of water-resistant fabrics that have been drycleaned.

For users of the Accelerotor (AATCC's high-speed-testing instrument for abrasion, laundering, and other purposes best served by random motion plus high speed velocity impact), the AATCC laboratories have provided abrasive liners specially designed for prolonged efficiency. Developed by research associate H E Glidden, these liners have been produced commercially and will be available in 5-yard rolls of 2¾-inch width.

COMMITTEE ACTIVITIES

Fourteen research committees will hold meetings on November 19th at the Hotel Commodore in New York in connection with the 177th meeting of the Technical Committee on Research, which convenes the following day in the West Ballroom at 1:30 PM. A notice of the schedule of these meetings was mailed recently by C W Dorn, chairman of TCR.

Harley Y Jennings has accepted membership on the Committee on Damage Caused by Retained Chlorine.

Marguerite P Kearns of J C Penney Co has been appointed a member to the Committee on Snag Resistance.

* Published every other issue of the AMERICAN DYESTUFF REPORTER.

EMPLOYMENT REGISTER

This column is open for two insertions per year, per member, without charge. Blanks can be obtained from, and filed with, the Secretary of the Association, Lowell Textile Institute, Lowell, Mass. It is understood that these will be open to inspection by prospective employers who can obtain further information from the Secretary.

53-31

Education: textile institute graduate, chemistry, dyeing and finishing.

Experience: chemist with eight years in textile industry and supplying companies; U S Army through war.

Age: 36; married; references; position in sales or technical service desired, New England or New Jersey. 10-26, 11-9

53-32

Education: textile institute.

Experience: dyer and chemist, wool, synthetics and cotton.

Age: 49; married; references; position as chemist or dyer desired, East coast. 10-26, 11-9

CALENDAR

AATCC

COUNCIL
1953—Nov 20 (Hotel Commodore, New York)
1954—Jan 27, Apr 30, June 15, Sept 15, Nov 19.
1955—Jan 21, Apr 15, June 17

NATIONAL CONVENTIONS
Sept 15-18, 1954 (Atlanta Biltmore, Atlanta, Ga); Sept 21-23, 1955 (Chalfonte-Haddon Hall, Atlantic City, N J).

HUDSON-MOHAWK SECTION
Dec 4, Jan 22 (Albany); March 5; April 9, May 14 (Albany); June 18 (Outing).

MID-WEST SECTION
February 13 (Hotel Bismarck, Chicago, Ill).

NEW YORK SECTION
Nov 20 (Swiss Chalet); Jan 29, Feb 26 (Hotel Statler, N Y); April 23, May 21, (Swiss Chalet).

NORTHERN NEW ENGLAND SECTION
Dec 4 (Lowell Technological Institute, Lowell, Mass).

PACIFIC SOUTHWEST SECTION
Nov 20, Jan 29.

PIEDMONT SECTION
Jan 30 (Hotel Poinsette, Greenville, S C); Apr 10 (Hotel Roanoke, Roanoke, Va); June 11-12 (Outing, Mayview Manor, Blowing Rock, N C); Sept 11 (Hotel Barringer, Charlotte, N C).

PHILADELPHIA SECTION
Dec 4, Jan 15.

RHODE ISLAND SECTION
Dec 4 (Annual Meeting, Sheraton-Biltmore, Providence).

SOUTH CENTRAL SECTION
Dec 5 (Patten Hotel).

WESTERN NEW ENGLAND SECTION
Dec 11 (Rapp's Restaurant, Shelton, Conn).

Report of Rhode Island Section Meeting

October 23, 1953
Providence, R I

AT THE October 23rd meeting of the Rhode Island Section, held at the Providence Engineering Society, Providence, R I, J K Park, laboratory director, Owens-Corning Fiberglas Corp, acted as moderator at a "Symposium on Fiberglas Textiles". Panel members included the following three members of Owens-Corning's Research and Development Laboratories: R F Caroselli, manager, Decorative Fabrics Division; Richard Horton, manager, Industrial Fabrics Division; and Alfred Marzocchi, manager, Textile Yarns Division.

Approximately 135 members attended the technical session and 75 members participated in the pre-meeting social hour and dinner at the Sheraton-Biltmore Hotel.

RHODE ISLAND SECTION MEETING • OCTOBER 23, 1953

Photos by
Kenneth C Everett

Upper left: **(Seated, l to r): Harold W Stiegler, AATCC Director of Research; Alden D Nute, Councilor, R I Section; Ernest J Chornyei, Chairman, R I Section; J K Park, lab director, Owens-Corning Fiberglas Corp. (Standing): R F Caroselli, Mgr, Decorative Fabrics Div, Owens-Corning Fiberglas Corp; Richard Horton, Mgr, Industrial Fabrics Div, OCFC; and Alfred Marzocchi, Mgr, Textile Yarns Div, OCFC.** ***Upper right:*** **R F Caroselli demonstrates the flameproof qualities of glass cloth.** ***Lower left:*** **Alfred Marzocchi (left) and Richard Horton examine a piece of cloth made from spun fiberglas.** ***Lower right:*** **Charles F Stokes, Secretary, R I Section; Thorwald Larson, Councilor, R I Section; George O Linberg, National Vice President, New England Region.**

NOTICE TO DYE MANUFACTURERS

THE Tabulation of American Dyes has been completely revised for the 1953 Technical Manual and Year Book. It will not have another complete revision until 1955. However, there will be an opportunity in the 1954 edition for the correction of any errors that may be discovered, and for any changes in C I or Pr numbers that may be requested. Communications regarding such corrections and changes should be sent to the undersigned not later than January 1, 1954. It is not planned to add any new dyes at this time.

William H Cady
Editor, Technical Manual and Year Book
127 Power Street
Providence 6, Rhode Island

AATCC Committee on Colorfastness to Light——

REPORT ON COMPARATIVE SUNLIGHT AND FADE-OMETER TESTS OF SELECTED DYED MANUFACTURED FIBER SAMPLES*

MATTHEW J BABEY, Chairman

SEVENTY-FIVE synthetic fiber samples (cellulose, acetate, Acrilan, Dacron, dynel, nylon and Orlon) were exposed for two steps, under glass and in direct sunlight, in Florida by South Florida Test Service during February, March and April of 1952.

From the above, 22 were selected and exposed in 4 steps by ten different laboratories in their FDA—R Fade-Ometers. During these exposures the black panel temperature, mercury bulb or bimetallic dial thermometer temperature of the ambient air in the lamp, room temperature and relative humidity in the Fade-Ometer were taken. (See Appendices A & B.)

The object of this survey was to learn the extent of difference between sunlight and Fade-Ometer exposure, and how much under varying conditions (if they existed) the various Fade-Ometer exposures differed.

All of the exposures were mounted, and members of the AATCC Committee on Colorfastness to Light evaluated the results by use of the new Grey Scale adopted as a tentative method by the International Organization for Standardization for evaluating change in color. (See Appendix C.)

From these results it can be said that the character of fading is similar between sunlight and Fade-Ometer and the rate of fading, in many cases, faster in the Fade-Ometer.

The meaning of character of fading is that the sample may fade not only in loss of strength (weaker) but also in hue change.

When samples are tested (or exposed) in a Fade-Ometer with a black panel temperature consistently over 175°F the rate of fading is considerably faster and some samples will have a tendency to be scorched or burnt.

These same samples in the future will be exposed in our new research model Fade-Ometer under the following conditions of temperature and relative humidity:

1) high temperature —low humidity
2) high temperature —high humidity
3) low temperature —low humidity
4) low temperature —high humidity

* These tests were made under the direction of Charles A Seibert, AATCC Research Associate; Matthew J Babey, Colorist, Calco Chemical Division (Chairman, AATCC Research Sub-Committee on Colorfastness to Light); Joseph E Norton, Director of Research, Atlas Electric Devices Co.

Appendix A

INTERLABORATORY FADE-OMETER TESTS OF SOME DYED MANUFACTURED FIBER SAMPLES

	Temperature			Relative Humidity	
	Black Panel	Mercury Bulb or Bimetallic Dial			
	lamp °F	lamp °F	room °F	lamp %	room %
A1	142-146	98-100	86-90	38-42	
A	160-178	106-110	86-90	25-38	
B	166-180	102-112	85-92	26-38	65-78
C	156-160	100-102	84-90		
D	160-185	91-102	85-93	42-56	50-60
E	188-206	110-114		65-69	
F	146-160	96-108	82-93		43-57
G	180-190	107-111		20-24	
H	159-190	99-110	76-89	39-42	50-80
I	160-175	96-116	89-99	25-35	

Appendix B

Sample No	Fiber	Dye
1	acetate	1% Amacel Yellow G
2	acetate	1% Eastman Fast Blue GLF
3	Acrilan	Yellow Unknown at Present
7	Acrilan	Blue Unknown at Present
9	Acrilan	Green Unknown at Present
11	Dacron	1% Acetamine Yellow N
13	Dacron	1% Acetamine Rubine B
16	Dacron	1% Celanthrene Red 3BN Conc
20	Dacron	1% Celanthrene Fast Blue 2G
25	Dacron	5% Acetamine Diazo Black 3B Acetamine Developer AD Extra
27	dynel	1% Artisil Direct Yellow G
33	dynel	1% Xylene Milling Blue BL
57	nylon	1% Celliton Fast Rubine BA
60	Orlon	2% Acetamine Yellow N
61	Orlon	2% Quinoline Yellow PN
64	Orlon	10% Sulfanthrene Brown G Paste
67	Orlon	2% Pontacyl Carmine 2G 150%
68	Orlon	2% Pontacyl Fast Red AS Extra Conc
69	Orlon	10% Sulfanthrene Pink FF Paste
70	Orlon	2% Anthraquinone Blue SWF 150%
71	Orlon	2% Anthraquinone Iris R
75	Orlon	2% Victoria Green SC

Appendix C

ISO/TC 38/SC 1 (USA Secretariat 15)
January 30, 1953

International Organization for Standardization
Technical Committee on Textiles
Subcommittee on Color Fastness Tests

Proposed 1st Draft*
COLORFASTNESS: GRAY SCALE FOR EVALUATING CHANGE IN COLOR

1. PURPOSE AND SCOPE

This standard describes the Gray Scale for evaluating changes in color of textiles in colorfastness tests and its use. A precise colorimetric specification of the Scale is given as a permanent record against which newly prepared working standards and standards that may have changed can be compared (See 4.1).

2. GRAY SCALE FOR EVALUATING CHANGE IN COLOR

2.1) *The Scale* consists of 5 pairs of gray color chips (or swatches of gray cloth) each representing a visual difference in color or contrast. The differences represented and corresponding numerical fastness ratings are as follows:

Color Differences in NBS Units (Judds) (See 4.2)	*Fastness Rating*
0	5
1½	4
3	3
6	2
12	1

2.2) *Fastness Rating 5* is represented on the scale by two identical chips (or swatches) mounted side by side, neutral gray in color and having a reflectance of 12 ± 1% (See Sec 3). The color difference is 0.

2.3) *Fastness Ratings 4 to 1, inclusive,* are represented by a "reference" chip (or swatch) identical with those used for Grade 5, paired with similar but lighter neutral gray chips (or swatches), the visual differences in the pairs being in geometric steps of color difference, or contrast, as shown in the table.

2.4) *Use of the Scale.* Place a part of the original textile and the tested specimen of it side by side in the same plane and oriented in the same direction. Place the Gray Scale nearby in the same plane. The surrounding field should be uniform gray of a brightness slightly less than that of the darkest member of the Gray Scale. If necessary to avoid effects of the backing on the appearance of the textiles, use two or more layers of the original textile under both original and tested specimen. Illuminate the surfaces with north sky light or equivalent source with illumination of 50 footcandles or more. The light should be incident upon the surfaces at approximately 45° and the direction of viewing approximately perpendicular to the plane of the surfaces. Compare the visual difference between original and tested textile with the differences represented by the Gray Scale. The numerical rating of the fastness in the test with respect to change in color is the number of the step of the Gray Scale of equal or next greater contrast to that of the material tested. For example, if the contrast between original and tested material is greater than that of the pair of grays numbered 4, but less than grays numbered 3, the fastness of the textile in the test with respect to change in color is 3. Intermediate ratings, as 4-3, may be given.

2.5) Describing color changes in fastness tests.

2.5.1) In using the Gray Scale (as outlined in 2.4), the character of the change in color, whether in hue, depth, brightness, or any combination of these is not rated, the overall difference, or contrast, between original and tested specimen is the basis for the evaluation.

2.5.2) If, as in rating dyestuffs on textiles, for example, it is desired to record the character of the change in color of the textile in the test, appropriate qualitative terms may be added to the numerical rating, as illustrated by the following examples:

Rating		*Meaning*
3	contrast equal to Grade 3 of the Gray Scale	change is a loss in depth of color only.
3 redder	contrast equal to Grade 3 of the Gray Scale	no significant loss in depth, but color has become redder.
3 weaker, yellower	contrast equal to Grade 3 of the Gray Scale	loss in depth and change in hue have occurred.
3 weaker, bluer, duller	contrast equal to Grade 3 of the Gray Scale	loss in depth and change in both hue and brightness have occurred.
4-5 redder	contrast intermediate between 4 and 5 of the Gray Scale	no significant loss in depth but color has become slightly redder.

2.5.3) When changes in color occur in two or three directions it is considered neither feasible nor necessary to indicate the relative magnitude of each change, either in words (such as "much" or "little") or by number (e g, 1 = small, 3 = large), or even by putting the larger change first (i e, "bluer, duller" being different from "duller, bluer").

3. COLORIMETRIC SPECIFICATION OF THE GRAY SCALE

3.1) The precise colorimetric specification of the standard gray colors of the scale given in this section is derived from section 2.

3.2) Actual Gray Scales used as working standards should approximate these colors closely, particularly in color spacing.

3.3) The tristimulus values for the gray colors for 45° illuminating and normal viewing under CIE standard source C are given in the following table (See 4.3).

Fastness Rating	*Tristimulus Values for 45-normal illuminating and viewing under CIE standard source C*						*NBS units of color difference*
	First Color			*Second Color*			*Judd*
	X	*Y*	*Z*	*X*	*Y*	*Z*	
5	0.1176	0.1200	0.1417	0.1176	0.1200	0.1417	0.0
4	.1176	.1200	.1417	.1280	.1306	.1543	1.5
3	.1176	.1200	.1417	.1389	.1417	.1673	3.0
2	.1176	.1200	.1417	.1620	.1652	.1951	6.0
1	.1176	.1200	.1417	.2132	.2175	.2569	12.0

4. NOTES AND REFERENCES

4.1) Gray scales may be obtained from: The Society of Dyers and Colourists, 19 Piccadilly, Bradford, England.

4.2) Photoelectric Tristimulus Colorimetry, National Bureau of Standards Circular C429, pp 16 and 17, U S Government Printing Office, 1942.

4.3) Commission Internationale de l'Éclairage, Proceedings of the eighth session, Cambridge, England, p 19 and 29 (September 1931).

* This draft is based on ISO/TC 38/SC 1 (UK Secretariat 6) 7 and ISO/TC 38/SC 1 (UK Secretariat 8) 9, prepared as a result of discussions of the Subcommittee in New York, November, 1952.

TEST RESULTS

Sunlight Direct	Sunlight Under Glass	Sample	Hrs	A1	A	B	C	D	E	F	G	H	I
168 hrs 2	164 hrs 3-2	1	20	4-3	sl duller 3	sl duller 3	4	4		4-3	2-3	2-3	4-3
		1	40	2	2	2	3	3		3-2	1	1	3-2
		1	80	1	1	1	2-1	2-1		1	1	1	2-1
		1	160	1	1	1	1	1		1	1	1	1
36 hrs 4	19 hrs 4	2	5										
78 hrs 3	26 hrs 4	2	10										
		2	20										
		2	40	5-4	5-4	5-4	5-4	5-4	4	5-4	5-4	4	5-4
21 hrs 3-2	19 hrs 3	3	2½	3	4	4	4	3	4-3	4-3	4	4-3	4
36 hrs 2	26 hrs 3-2	3	5	3-2	3	3	3	3-2	3	3	3	3-2	3
		3	7⅓	2	3-2	3-2	3-2	2	2	2	1	2-1	3-2
		3	10	2-1	2	2	2	2-1	1	1	20 hrs 1	2-1	2
21 hrs sl redder 4	19 hrs redder 3	7	10	sl redder 4	sl redder 4	sl redder 4	4	4	sl redder 4-3	sl redder 4	redder 3	sl redder 4	sl redder 4
		7	20	sl redder 4-3	sl redder 4-3	sl redder 4-3	4-3	4-3	3-2	sl redder 4-3	burned	sl redder 4-3	sl redder 4-3
36 hrs sl redder 4-3	26 hrs redder 3-2	7	40	redder 3	redder 3	redder 3	redder 3	redder 3	burning effect 2	redder 3	burned	3-2	redder 3
		7	80	redder 3-2	redder 3-2	redder 3-2	redder 3-2	redder 3-2	burning effect 2	redder 2	burned	sl burning 2-1	redder 3-2
21 hrs 4	26 hrs 4	9	10						sl duller 4		sl burning 4-3	4	
		9	20						duller 3		burned 2	sl burning 4-3	
36 hrs 4	41 hrs 4	9	40				4	4	duller 3		burned 1	burnt 2	
		9	80	sl duller 4	sl duller 4	sl duller 4	3	4-3	duller 3-2	4	burned 1	burnt 1	sl duller 4
78.6 hrs 2	26 hrs 3	11	10	4-3	4-3	4-3	4-3	4	4-3	4-3	3	4	4
		11	20	3	3	3	3	4-3	3	3	2	4-3	4-3
168.1 hrs 2-1	41 hrs 2	11	40	3-2	3-2	2	3-2	3	2	2	2-1	3	3
		11	80	2	2-1	1	2	3-2	1	1	1	2	2-1
12 hrs yellower 3-2	19 hrs yellower 3	13	2½	sl yellower 4	v sl yellower 5-4	sl yellower 4	v sl yellower 5-4	sl yellower 4	sl yellower 4	v sl yellower 5-4	sl yellower 4	sl yellower 4	v sl yellower 5-4
		13	5	sl yellower 4	sl yellower 4	yellower 4-3	sl yellower 4	yellower 3	sl yellower 4	sl yellower 4	yellower 3	yellower 3	sl yellower 4
21 hrs consid yellower 2-1	26 hrs 3-2	13	10	3	3	3-2	3	3-2	3-2	3-2	1	2-1	3
		13	20	2-1	2	2-1	2	1	2-1	2-1	1	1	2
21 hrs yellower 3	26 hrs yellower 3	16	2½	v sl yellower 5-4	v sl yellower 5-4	v sl yellower 5-4	v sl yellower 5-4	v sl yellower 5-4	v sl yellower 5-4	v sl yellower 5-4		v sl yellower 5-4	v sl yellower 5-4
		16	5	sl yellower 4	sl yellower 4	sl yellower 4	sl yellower 4	sl yellower 4	sl yellower 4	sl yellower 4		sl yellower 4	sl yellower 4
36 hrs yellower 3-2	41 hrs yellower 3-2	16	10	sl yellower 4-3	sl yellower 4-3	sl yellower 4-3	sl yellower 4-3	sl yellower 4-3	sl yellower 4-3	sl yellower 4-3	burned	yellower 3	sl yellower 4-3
		16	20	yellower 3	yellower 3	yellower 3	yellower 3	yellower 3-2	yellower 3-2	yellower 3	burned	burned 1	yellower 3-2

Sunlight Direct	Sunlight Under Glass	Sample	Hrs	A1	A	B	C	D	E	F	G	H	I
12 hrs consid redder 2	19 hrs redder 3-2	20	2½	consid redder 2	consid redder 2	consid redder 2	redder 3	consid redder 2	consid redder 2	consid redder 2	consid redder 1	consid redder 1	consid redder 2
		20	5	consid redder 1	1	1	2	1	1	1	1	1	1
21 hrs consid redder-weaker 1	26 hrs consid redder-weaker 2-1	20	10	consid redder 1	1	1	1	1	1	1	1—	1—	1
		20	20	consid redder-weaker 1	1	1	1	1	1	1	1—	1—	1
78 hrs 2	82 hrs 2	25	10	4	4		4	4	4	4	3-2	3	4
		25	20	4	4-3		4	4	4-3	4-3	1	2	4-3
168 hrs 1	164 hrs 1	25	40	4-3	2		4-3	4-3	2	2	1—	1—	2
		25	80	3-2	1		3-2	3-2	1	1	1—	1—	1
21 hrs 5-4	26 hrs 5-4	27	2½	5-4	5-4	5-4	5-4	5-4	5-4	5-4	5-4	5-4	5-4
		27	5	4	4	4	5-4	4	4	4	4-3	3	4
36 hrs 4	41 hrs 4	27	10	3	3	3-2	4	3-2	3-2	3-2	1	1	3-2
		27	20	1	1	1—	3	1—	1—	1—	1—	1—	1
21 hrs 5	19 hrs 5	33	10	5-4	5-4	5-4	5	5	sl burned 1	5	burned 1	5-4	5-4
		33	20	4-3	4-3	sl burned 2	4	v sl burned 4	burned 1—	3	consid burned 1—	burned 1	4-3
36 hrs 4	26 hrs 5-4	33	40	sl burned 1	sl burned 1	burned 1	sl burned 1	sl burned 1	consid burned 1—	sl burned 1	consid burned 1—	consid burned 1—	sl burned 1
		33	80	burned 1—	burned 1—	consid burned 1—	burned 1—	burned 1—	consid burned 1—	burned 1—	consid burned 1—	1—	burned 1—
12 hrs consid yellower 2	19 hrs consid yellower 2	57	2½	sl yellower 4	4	4	4	4	4	4	3	3	4
		57	5	yellower 3	3	3	3	3	3	3	2	2	3
21 hrs 1	26 hrs 2-1	57	10	2	2	2-1	2	2	2-1	2-1	1—	1—	2
		57	20	1	1	1—	1	1	1—	1—	1—	1—	1
168 hrs sl redder 2	82.2 hrs 3	60	5	5-4	5-4	5-4	5-4	5-4	5-4	5	5-4	5-4	5-4
		60	10	5-4	5-4	5-4	5-4	5-4	5-4	5-4	5-4	5-4	5-4
	164.4 hrs 2	60	20	4	4	4-3	4	4	4	5-4	3	3	4
		60	40	3	3	1	4-3	3	2-1	3-2	sl burned 1	1—	3
78 hrs sl redder 5-4	41.1 hrs 5-4	61	5	5	5	5	5	5	5	5	v sl redder 5-4	sl redder 4	5
		61	10	5-4	5-4	sl redder 4	5	v sl redder 5-4	v sl redder 5-4	v sl redder 5-4	sl redder 4-3	redder 3	v sl redder 5-4
168 hrs consid redder 2	82.2 hrs sl redder 4	61	20	sl redder 4	sl redder 4	redder 3	sl redder 4	sl redder 4	redder 3	sl redder 4	consid redder 2-1	consid redder 2-1	sl redder 4
		61	40	redder 3	redder 3-2	redder 3-2	redder 3-2	redder 3-2	redder 2	redder 3-2	burned 1—	consid redder 1	redder 3-2

Sunlight Direct	Sunlight Under Glass	Sample	Hrs	A1	A	B	C	D	E	F	G	H	I
21 hrs 4-3	19 hrs 4-3	64	10	5	5-4	5-4	4	4-3	4	3	1	2	3
		64	20	5-4	4	3	3	3	3	3	1	1	3
36 hrs 3	26 hrs 3	64	40	4-3	3	2	2	2	2	2	1	1	2
		64	80	2	2	1	1	1	1	1	1	1	1
12 hrs sl blue— sl duller 4	19 hrs bluer— duller 3	67	2½	bluer 2	bluer 2	bluer 2	bluer 3-2	bluer 2	consid bluer 2-1	bluer 3-2	bluer 3-2	bluer 2	bluer 2
		67	5	consid bluer 1	consid bluer 1	consid bluer 1	consid bluer 2	consid bluer 1	consid bluer 1	consid bluer 2	bluer 3-2	consid bluer 1	consid bluer 1
21 hrs bluer— duller 3	26 hrs bluer— duller 3-2	67	10	consid bluer 1	consid bluer 1	consid bluer 1	consid bluer 1	consid bluer 1	consid bluer 1	consid bluer 1	consid bluer sl burned 1—	consid bluer 1	consid bluer 1
		67	20	consid bluer 1	consid bluer 1	consid bluer 1	consid bluer 1	consid bluer 1	consid bluer 1	consid bluer 1	burned 1—	consid bluer 1—	consid bluer 1
12 hrs 5-4	19 hrs 5-4	68	2½	5-4	5-4	5-4	5-4	5-4	5-4	5-4	bluer 3	4	5-4
		68	5	4	4	4	4	4	4	4	bluer 3	4	4
21 hrs 4	26 hrs 4	68	10	4-3	4-3	4-3	4-3	4-3	4-3	4-3	consid bluer 2	3-2	4-3
		68	20	3	3	3	3-2	3	3	3	burned 1	2	3
78.6 hrs 4-3	82.2 hrs 4-3	69	2½	5	5	5	5	5	5	5	5	5	5
		69	5	5	5	5	5	5	5-4	5	5-4	5-4	5
168.1 hrs 3-2	164.4 hrs 3-2	69	10	5-4	5-4	5-4	5-4	5-4	5-4	5-4	4	4	5-4
		69	20	5-4	5-4	5-4	5-4	4	5-4	4-3	3	3	5-4
12 hrs sl duller 5-4	19 hrs sl duller 4	70	2½	5-4	4	4	5-4	5-4	5-4	4	3	4	5-4
		70	5	5-4	4-3	4-3	4	4	4	4	3	4-3	4
21 hrs sl duller 4	26 hrs duller 4-3	70	10	4-3	3	4-3	4	4	3	3	2	3	4
		70	20	3	3	3	3	3	3-2	3	2-1	2	4-3
12 hrs 5	19 hrs 5	71	2½	5	5	5	5	5	5	5-4	5-4	5-4	5
		71	5	5	5	5	5	5	5	5-4	5-4	5-4	5-4
21 hrs 5-4	26 hrs 5-4	71	10	5-4	4	4	5-4	5-4	4	4	3-2	3	5-4
		71	20	4	4	4	5-4	5-4	4-3	4	2-1	3-2	4
12 hrs 4	19 hrs 4-3	75	2½	5-4	4	4	5-4	4	4	4	4-3	4-3	5-4
		75	5	5-4	4	4	5-4	4	4	4	4-3	3	5-4
21 hrs 4-3	26 hrs 3	75	10	4	3	3	4	3	3	3	2	3-2	4
		75	20	4	3-2	3-2	3	3-2	3-2	3-2	2-1	2	3

FDC Student Chapter Organizes for New Year

THE Fairleigh Dickinson College Student Chapter held their organization meeting and election of officers last month at Rutherford, N J. The Chapter boasts approximately 25 members.

New officers include James Polito, *chairman;* Joseph Nosal, *vice chairman;* Charlotte Dietrich, *secretary;* and Nicholas Trocolar, *treasurer.*

NNE Section to Meet at LTI on Dec 4

THE December 4th meeting of the Northern New England Section, originally scheduled to be held at Massachusetts Institute of Technology, will be held instead at the Lowell Technological Institute, Lowell, Mass. Roland Derby, 1953 Olney Medalist, will be the speaker.

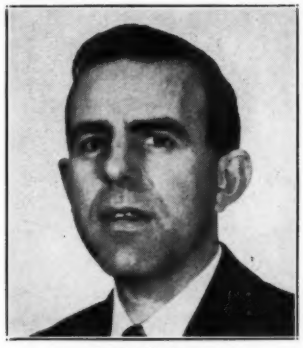
Buttons bearing the insignia of the AATCC are now available from the Secretary at a new price of $2.25. Pins, with safety clasp, are also available at $2.50 each. Write directly to H C Chapin, AATCC Secretary, Lowell Textile Institute, Lowell, Mass.

Mid-West Section——

SOME ASPECTS OF DETERGENCY AND DETERGENT TESTING*

R E WOLFROM AND A C NUESSLE

Textile Research Laboratory, Rohm and Haas Co, Philadelphia, Pa



R E Wolfrom

Because of the importance of detergency as a textile operation, and because of the large number of detergents on the market, the task of selecting the best product for a given end use is often a formidable one. Insofar as the average textile processor is concerned, the final and conclusive test is, of course, a plant trial on his equipment and in his particular end use—whether it be grease-wool scouring, removal of loom dirt from nylon, or kier-boiling of cotton. But trials on full-scale equipment are cumbersome and time-consuming, and generally to be resorted to only after preliminary small-scale screening has separated the good from the bad and narrowed the field to two or at most three prospects. The selection of an adequate and meaningful screening test is therefore an important factor in evaluating detergents.

From a purely scientific approach it would be desirable to divide the phenomenon of detergency into a number of separate phases—preferential wetting, adsorption, emulsification and the like—and to measure the efficiency of the detergent in each phase.

Unfortunately, it is only in rare instances that such data can be utilized to predict the efficiency of the detergent in a given end use. It is for this reason that a large number of practical end-use tests have been contrived over a long period of time by many different persons or groups.

In this paper the authors discuss some of the factors which must be taken into account in designing or selecting a test method. Among these are fiber and soil types, presence of builders, water conditions, foam, temperature, total soil load and rate of agitation.

Because of the influence of these and other factors, a detergent which is superior under one set of conditions may be inferior under another.

Since all factors cannot always be controlled in the laboratory it is ofttimes necessary to utilize an end-use test in product development studies. Here all of the variables are present but not under precise control. Examples illustrating this type of approach are also discussed.

INTRODUCTION

SOAP, in one form or another, has been made and used since ancient times. According to the Roman naturalist Pliny, one of the earliest types was made of goat tallow plus elixir of wood ashes. History does not record who first concocted such a material, or how he came to discover that it could be used for laundering purposes. But, as late as 1790, novelty was still being claimed for parts of the manufacturing process: in that year the first United States Patent was granted to Samuel Hopkins on his method of manufacturing potash from wood ashes. Today wood ashes have given way to electrolytic caustic soda as the source of alkali, but millions of pounds of soap are still being made by modifications of the original process.

The virtues of soap (which is one of the best detergents in soft water) and its drawbacks (chiefly its propensity to precipitate in hard or acidic water) are too well known to need retelling here. Because of its virtues, soap was manufactured to the extent of 2,324,000,000 lb in this country in 1951 *(8)*. Because of its drawbacks, however———and in some instances for economic reasons———soap has largely been replaced in certain uses by synthetic detergents, many of which contain no tallow components and no caustic soda. Total production of all synthetic types amounted to 1,255,000,000 lb in 1951 *(8)*.

Synthetic detergents are available in a variety of forms: sulfated alcohols and sulfonated oils, which were the first to overcome the problem of precipitation in hard water; alkylarylsulfonates, which originated in Germany during World War I when natural fatty raw materials were scarce; various ethylene oxide condensates, which contain no sodium or other ions; and a host of other materials. It appears that any chemical manufacturer worthy of the name can make a synthetic detergent, and most of them do. McCutcheon *(7)* lists over 700 surfactants manufactured by some 100 companies. Despite their great variety, all detergents are structurally similar in one respect: each contains a hydrophobic (water-insoluble) group, and a hydrophilic (water-soluble) group. It is the balance between these groups which gives the detergent its valuable properties.

The chemistry of surfactants is beyond the scope of the present discussion. However, a simple distinction between anionic, cationic, and nonionic types may be worth reiterating. Referring to Figure 1, it will be seen that a molecule of sodium chloride (common table salt) on dissolving in water will dissociate to form a cation (positively-charged sodium) and an anion (negatively-charged chlorine). In ordinary soap, or sodium stearate, the long fatty stearate chain is the anion and the compound is therefore called anionic. In quaternary salt types, however, the long fatty chain is the cation, and the compound is called cationic. In the case of the ethylene oxide condensates the molecule does not dissociate into ions, and the compound is called nonionic. This distinction is important because the anionic and cationic types are sometimes thrown out of solution by other ionic materials. For example, most anionics are incompatible with most cationics, as indicated in Figure 2. The well-known incompatibility of ordinary soap with calcium salts or acidic materials is likewise the result of its ionic nature.

The nonionics, on the other hand, are generally compatible with any materials with which they are likely to come into contact. They are, however, subject to a phenomenon known as inverse solubility; that is, they are more soluble cold than hot, and on raising the temperature a "cloud point" is reached, beyond which the solution becomes quite turbid. This does not mean that they have lost their activity, however; with reasonable agitation, the microscopic droplets will remain suspended, ready to perform their expected function. It has been shown elsewhere *(10)* that wetting efficiency does not undergo any noticeable change at the cloud point. There is also ample evidence that cloud point, as such, likewise has no adverse effect on detergent efficiency; and one example of the use of a nonionic far above its cloudpoint will be given in a later section.

* Presented by R E Wolfrom before the Mid-West Section at the Netherland Plaza Hotel in Cincinnati, Ohio, on April 18, 1953.

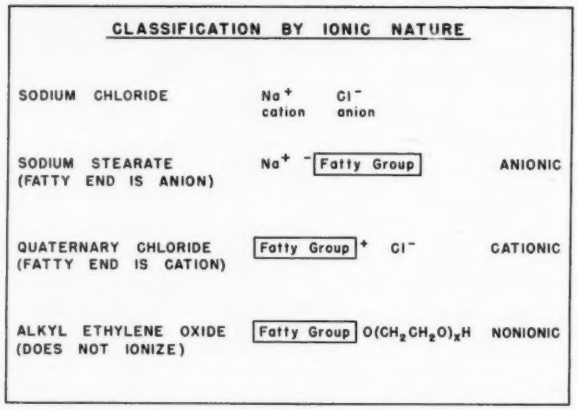


Figure 1

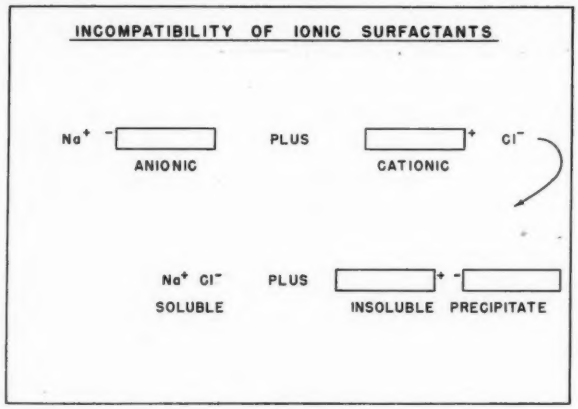


Figure 2

DETERGENCY TESTS

Because of the importance of detergency as a textile operation, and because of the large number of detergents on the market, the problem of selecting the best product for a given end use is often a formidable one. Insofar as the average textile processor is concerned, the final and conclusive test is, of course, a plant trial on his equipment and in his particular end use———whether it be grease wool scouring, removal of loom dirt from nylon, or kier-boiling cotton. But trials on full-scale equipment are cumbersome and time-consuming, and generally to be resorted to only after preliminary small-scale screening has separated the sheep from the goats and narrowed the field to two or at most three prospects. The selection of an adequate and meaningful screening test is therefore an important factor in evaluating detergents.

SCIENTIFIC APPROACH———From a purely scientific approach, it would be desirable to divide the phenomenon of detergency into a number of separate phases and measure the efficiency of the detergent in each phase. Thus we might consider that the detergent performs at least three functions: 1) allows the water to wet both the soil and the surface being cleaned; 2) is adsorbed onto the surface, preferentially wetting it so that the soil is displaced; 3) emulsifies oily soil and deflocculates and disperses solid soil, keeping them suspended so that they can be rinsed away. If these were the only factors, and if it were possible to measure each one independently, and if the data could then be combined into suitable mathematical formulas, we might arrive at a detergency rating from which the efficiency of a detergent might be predicted.

Unfortunately, detergency is such a complicated and varied process, with many possible interactions between the various soils, the surfaces, the water, and the detergent and various builders, that it is difficult to establish exactly what roles the detergent plays. Thus the simple wetting of the soil and the surface by the detergent solution may involve surface tension, two interfacial tensions (solution/soil and solution/surface) and two capillary attractions. Subsequent activities depend (according to the many investigators who have studied detergency) on such factors as adsorption, micellar solubilization, deflocculation, emulsification, protective action, suspendibility, and ion exchange.

It is not easy to establish which of these factors are of primary importance, and which are secondary. Adam *(1)* puts the chief emphasis on preferential wetting, while McBain *(6)* apparently believed that the solubilizing and suspending actions are the important ones. Quite likely the demands made upon a detergent vary somewhat, depending on the exact end use to which it is put.

Assuming that the major factors are known, it would still be difficult to obtain valid measurements in certain instances. Micellar solubilization, for example, is classically measured by solubilizing water-insoluble dyes; and it is questionable whether data so obtained can be applied to solubilization of chemically dissimilar soil particles, even if they were of the same size and shape as the dye particles.

It should be made clear that we are not attempting to disparage the excellent and ofttimes brilliant work of the many researchers into the fundamentals of detergency. Only by the continuance of such studies on all phases of the problem can we hope eventually to obtain a complete picture of the mechanism of detergent action. Thus, studies such as the recent work of Vold and Koneczy *(9)* and of Mankowich *(5)* on soils, and of Fineman *(4)* on surfaces, should be combined and extended and eventually integrated with earlier work on the properties of detergent solutions. But such an integration, because of the number of variables, cannot be regarded as attainable in the near future.

PRACTICAL APPROACH———It is for this reason that a large number of practical end-use tests have been contrived over a long period of time and by many different persons or groups. Probably every plant laboratory has at least one "special" test which it has devised for its own use. Such tests have been, and for some time to come shall continue to be, the workhorses of the industry.

For the evaluation of wetting efficiency, tests have been proposed involving sinking times of bundles of yarn, or squares or discs of fabric, floated on the surface of the surfactant solution; as well as sinking times of skeins of yarn or squares of fabric submerged in the solution. More recent procedures concern the increase in specific gravity of skeins of yarn, or woven tapes, fastened to hydrometers submerged in the solution. For evaluation of rewetting agents, tests have involved measurement, by various means, of the absorbency of fabric into which the surfactant has been dried. Tests based on certain of these methods have gained rather widespread acceptance. Thus, one wetting test——— the Draves———has become an AATCC standard (17-43), while two others——— evaluation of mercerization penetrants (43-45) and rewetting agents (27-44) ———are tentative standards. These methods undoubtedly have considerable merit, and are capable of meeting the two requirements for a satisfactory test method: 1) suitable precision or reproducibility of results, and 2) correlation with at least one ultimate end use. We must recognize, however, certain limitations inherent in every test method: it cannot be expected to correlate with every end use, nor with all possible conditions of a given

Figure 3
Equipment Used in Wool Scouring Test

end use. Thus the Draves test, based on wetting of greige cotton yarn, is not necessarily of value in judging the efficiency of wetting of other hydrophobic surfaces. Even if limited to greige cotton, it should not be used at, say, room temperature to predict wetting efficiency at an elevated temperature *(10)*. Only when, by practical trial, such correlation has been established, can we employ the test with assurance that the results will have value.

In detergency, which is a more complicated process than wetting, the same principles hold true. A detergent which is superior for one purpose may prove to be only mediocre for another. Moreover, in a given end use, it may be satisfactory under one set of conditions and unsatisfactory under another. Therefore, in comparing detergents on a small scale, in order to judge their efficiency in a given plant operation, it is important that the conditions of test bear some resemblance to the conditions of proposed use.

The purpose of the present discussion is to illustrate, with a few examples from actual laboratory and plant experience, some of the difficulties in selecting a suitable end-use test.

SCOURING RAW WOOL STOCK

Raw wool is by nature an uncontrolled product, subject to wide variation in soil content. Because of this, we attempted some years ago to standardize the grease-and-fiber content and eliminate the influence of suint salts and other impurities. In this work, AATCC wool tubing was extracted with petroleum ether and alcohol to remove any spinning oil or soaps, padded through a solvent solution of filtered wool grease obtained from a commercial solvent scour, and dried.

Sections of this tubing, containing 10% grease, were then scoured in detergent solution by one of three methods: 1) tumbling in a Launder-Ometer, 2) immersion in the solution with intermittent stirring; and 3) immersion followed by padding through the solution. The residual grease content of the scoured wool was determined by the rapid extraction method of Creeley *(3)*.

Representative data and an outline of the scouring methods are shown in Table I.

It is readily evident that soap is best, nonionic A is poor, and soda ash alone is least effective. The comparison was on an equal-cost basis, so that the concentrations were unequal; nevertheless, the poor showing of the nonionic was disturbing, from the viewpoint of a manufacturer of nonionics.

However, since we had no reason to suspect the validity of the data as far as reproducibility and ease of operation were concerned, we proceeded with further tests in the Launder-Ometer. Subsequent tests on three commercially available anionics gave values between 4.4 and 5.2% residual grease, which rated them only equal to soda ash alone. Since these materials had shown fair-to-good performance in actual practice, we knew that something was inherently wrong with our test method.

It was obvious that, in our attempt at precise control of a few variables, we had either omitted some important factors or introduced some interfering ones. Since it seemed logical, in order that our test correlate with end use, for us to include all the important variables at levels in which they would be found in actual practice, we decided to rely on a time-honored end-use test.

Our method, similar to those already in use in the industry, utilized raw grease wool, carried in a wire basket which was dipped successively into four ordinary enamelware buckets, which simulated the bowls of a scouring train (see Figure 3). Bath ratios, temperatures, and degrees of agitation could thus be maintained at the normal level. This method, even in the rough form in which we first used it, gave us results we were happy to accept, and we never went back to determine the reason for the poor results previously obtained.

TEST METHOD———From a stock of well-mixed grease wool, a 25-g sample is withdrawn and placed in a wire basket, which just fits inside a 10-qt enamelware bucket. The wool is successively immersed for three-minute periods in a series of four such buckets (simulating the bowls of a scouring train) each containing 5 liters of solution. While the sample is in each bowl, the basket is lifted momentarily free of the solution after one and two minutes elapsed time; this is the only agitation the wool receives. However, a hand-operated household wringer is used to express the liquor after each bowl.

The standard control train is as follows:

TABLE I
SCOURING PROCEDURES AND DATA FOR WOOL TUBING CONTAINING 10% APPLIED WOOL GREASE

A. Procedure:

Operation	*Launder-Ometer*	*Beaker*	*Beaker-Pad*
Scour: 5 g tubing, 100 ml solution, 140°F.	10-min run, pad.	½-min stir, 5-min stand, repeat once.	2-min stand, pad, repeat 4 times.
Rinse: 100 ml water, 140°F.	5-min run, pad, dry.	repeat scour cycles, pad, dry.	repeat scour cycles, pad, dry.

B. Data:

% Scouring Solution	*% Residual Grease*	*% Residual Grease*	*% Residual Grease*
0.35 soap 0.25 soda ash	0.17	0.31	0.10
0.125 nonionic A 0.25 soda ash	1.72	1.06	0.84
0.25 soda ash	4.88	2.57	2.41

Bowl	Solution	Time	Temp
		min	°F
1	0.5% soda ash	3	120
2	0.015% nonionic A 0.25% soda ash	3	120
3	0.005% nonionic A	3	120
4	water only	3	120

This system may be altered to suit any operating conditions of time, temperature and other variables.

Back flow can be simulated by dippering the liquor proportionately between the bowls.

After the rinse the wool is dried on a screen in a forced-draft oven at 230-240° F. Residual grease is determined by Soxhlet or cup-and-plunger methods.

To show the reproducibility of the test, and incidentally to show the uniform scourability of commercially available wool stock, samples were taken from the top, center and bottom of a fifty-pound bag of opened wool, which happened to be 56's ½ blood Domestic. One-half of each sample was extracted, while the other half was tested for scourability with a soap standard. Data in Table II show the reasonable precision of the test and illustrate the homogeneity of this particular wool. We can, of course, make no claim that all wool will scour this uniformly.

LABORATORY RESULTS——In a typical early experiment, the test procedure was used to compare two nonionic detergents with two soaps on an equal-cost basis. From the results, shown in Table III, it is evident that nonionic A is superior to either high or low-titer soap, as well as to a special dimeric type of nonionic containing two hydrophobe and two hydrophile groups.

In subsequent experiments it was shown (cf Table IV) that the concentration of the nonionic could be reduced appreciably before the performance dropped to the levels shown by the soaps. In later trials the nonionic proved to be more than competitive even when compared to an inexpensive fig soap, costing only one-fifth as much as these high-grade soaps. For example, 0.18% fig soap was required to give extractables of 0.55%, a level which could be attained with only 0.01% of nonionic A.

COMPARISON WITH PLANT RESULTS———Compared with actual practice, the control method simulates 1500 lb/hr of wool in a four-bowl train with an average of 75 lb of wool per bowl containing an average of 1900 gallons of liquor. Chemical charge approximates 40 lb soda ash and 3 lb nonionic A per 1000 gallons of liquor. By suitable repetition of the method, the soil loading in the bowls can be built up to use conditions,

TABLE II
REPRODUCTIBILITY OF BUCKET-AND-BASKET METHOD

Position in Bag	% Petroleum Ether Extractables Unscoured	Standard Soap Scour
Bottom	9.8	.52, .50, .51
Center	9.8	.57, .56, .41
Top	9.0	.59, .77, .52
Average	9.5	0.55

TABLE III
COMPARISON OF DETERGENTS BY BUCKET-AND-BASKET METHOD

Detergent*	Detergent Conc % Bowl 1	Bowl 2	% Residual Grease
Nonionic A	0.06	0.02	0.33
Low-titer soap	0.128	0.042	0.44
High-titer soap	0.128	0.042	0.53
Dimeric Nonionic	0.06	0.02	0.94

* Plus soda ash, 0.50% in bowl 1 and 0.25% in bowl 2. Temperature 120°F, 5 liters solution in each bowl, 25 g wool. Concentration of detergent based on equal cost.

TABLE IV
EFFECT OF CONCENTRATION OF NONIONIC A

Detergent Type	Bowl 1 Conc*	% Residual Grease
Nonionic A	0.060	0.31
	0.025	0.35
	0.010	0.52
	0.005	1.08
	0.0025	3.04
Low-Titer soap	0.128	0.37
High-Titer soap	0.128	0.51
Soda ash alone	0.50	2.0

* Bowl 2 detergent concentration is one-third that of Bowl 1. Soda ash is 0.50% in Bowl 1 and 0.25% in Bowl 2.

and the necessary adds of soda ash and detergent can be made. However we have found that adds are unnecessary in duplicate or triplicate runs with the same liquor, and that the results correspond to practice without further simulation of actual conditions.

Through the co-operation of some forward-looking mills, plant trials were arranged wherein nonionic A was tested against a low-titer soap.

Scouring and cost data showed that our end-use test would correlate with field results. For 1000 lb of wool at 15% grease, 3 lb of nonionic A (36c/lb) and 50 lb of soda ash proved to be equivalent to 5.25 lb of soap (24c/lb) and 60 lb of soda ash. The cost of the soap scour was $2.46/1000 lb of wool, while that of the nonionic was $1.64; this represents a saving of 46%.

Concurrent with field evaluations of nonionic A, we continued our investigation of other surfactants in the laboratory. It should perhaps be emphasized that such research need not be haphazard, despite lack of elegance in the test method. Instead, a systematic study was made to determine the effect of variation in chemical structure on wool-scouring efficiency. From this study there was evolved a new surfactant having unusually high efficiency in this use. Our laboratory data indicated that it was 25% to 30% more effective than the original nonionic A.

To confirm the utility of this new material, which shall here be designated as nonionic B, there were conducted extensive plant trials, averaging 1.5 million pounds of wool per run. The results of these trials fully substantiated the fact that nonionic B is 25% more efficient than nonionic A, which in turn is at least 50% more efficient than soap. Typical data from plant production runs are listed in Table V, which also shows the cost picture.

Nonionic A has been a trade standard for nonionics in wool scouring, and there are several chemically similar materials which approach it. However, we believe that nonionic B is superior to any other material currently on the market.

Engineering data and recommendations for use of nonionic B are outside the scope of this paper and can be found in technical bulletins. It might be observed here, however, that———contrary to popular belief———these nonionics do not interfere with the recovery of the grease by centrifugal means. Not only are the yields satisfactory, but the recovered grease is usually lighter in color than when soap is used.

Thus far, we have shown the utility of a test which closely simulates end-use conditions. In the next section we will show the value of a simplified test, in which some of the end-use conditions have purposely been excluded.

TABLE V
SCOURING COSTS OF NONIONICS VS LOW-TITER SOAP ON APPAREL WOOL AT 15% GREASE

Detergent	Unit Cost*	Lbs/1000 wool Detergent	Soda Ash	Cost/1000 lbs†
Low-titer soap	0.24	5.25	60	$2.46
Polyoxyethylene ester of fatty acids	0.285	4.0	80	2.03
Nonionic A	0.36	3.0	50	1.64
Nonionic B	0.36	2.4	50	1.42

* Current prices.
† These costs allow for recharging the bowls at regular intervals and week-end clean ups where all bowls are dumped.

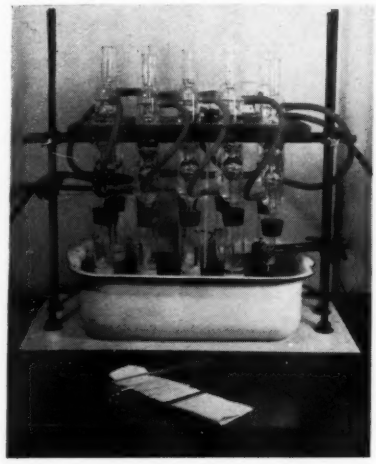


Figure 4
Reflux Equipment for Kier Test

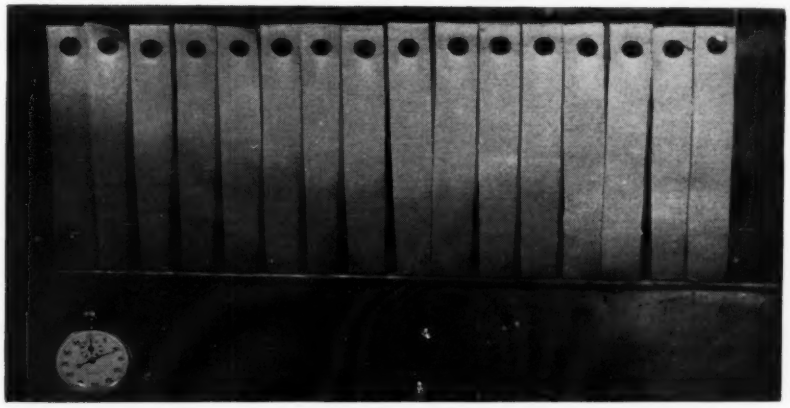


Figure 5
Wick-Rise Absorbency Test

KIER BOILING

The pressure kier boil is the most common method of scouring greige cotton, although for various reasons less drastic methods, such as jig, beck and open scouring, are ofttimes used.

The purpose of kiering is to remove cotton wax and other noncellulosic components of raw cotton; this is accomplished by a treatment with a hot alkaline detergent solution. In addition, dirt, oil or grease spots and other foreign matter are removed, and in many instances motes are softened and decolorized. As a result, the cotton becomes lighter in color and considerably more absorbent. Well-scoured cotton is practically pure cellulose.

The kier itself is a steel pressure tank holding from four to ten thousand pounds of cloth. It is usually eight to nine feet in diameter and about ten to twelve feet high. For knit goods and yarn bleaching it is generally smaller and more squat.

The kier has a false bottom or grating to support the goods; the space underneath provides a reservoir of kier liquor for the circulating pump, which carries the liquor to a spray head at the top of the tank. The goods are generally prewetted with hot kier liquor and plaited down in the kier, which is then sealed. Depending on the type of fabric, etc, the boil will vary from 2 to 10 hours at pressures of 6 to 15 psi. The boil is followed by a hot and cold rinse and other processing, such as a chlorine or peroxide bleach.

The ratio of goods to kier liquor is very low, generally about 1:3. A typical formulation, based on weight of fabric, is as follows:

2.5 to 3.0% sodium hydroxide
0.05 to 0.1% synthetic detergent
0.1 to 0.3% tetrasodium pyrophosphate

When we first decided to investigate the kiering process some years ago, we considered the construction of a miniature kier. But after engineering and cost estimates were made, we decided to utilize available laboratory equipment. Initial attempts were confined to a laboratory-size sterilizing autoclave wherein the fabric was placed in a wire basket immersed in the detergent solution. We found that the scour was usually efficient, but gave little spread in absorbency between detergents of known utility. Other tests utilized a single-package Franklin dyeing machine and even an all-glass coffee percolator. For these tests, fabrics, yarns and tapes were employed with very erratic results. All of these methods were cumbersome and not suited to our purposes.

Despite the fact that equipment less than a kier might not be satisfactory, we investigated less elaborate methods. Reasoning that the pressure only contributed to increased temperature, we resorted to an open boil with a reflux condenser to retain the liquor.

Our preferred method uses a test tube in order to allow for reduced bath ratio. Any method of drying can be utilized, although a pressing operation is essential to produce a wrinkle-free fabric for the subsequent wick absorbency tests.

The method is described below. Here again, no claim for novelty is made. While details of operation may vary, it is probable that similar tests have been widely used through the industry.

TEST METHOD ——— Samples of greige cotton twill, measuring 7 in fillwise and 10 in warpwise, are folded once along their length, rolled and placed in extra large test tubes (38 mm OD and 200 mm in length). A section of ⅜-inch glass rod is used to hold each sample down, and scouring solution seven times the weight of the fabric is then added.

The test tubes are then fitted with reflux condensers (cf Figure 4) and immersed in a glycerol or oil bath maintained at 250 ± 10° F. After refluxing for 3 hr, the fabrics are removed and rinsed in warm running water for 3 min, hydroextracted and then pressed under fabric in a flat bed ironer for 30 sec at 350-375° F.

After conditioning at least four hours at 70° F and 65% relative humidity, two strips 1 x 8 in (warpwise) are cut from each sample. A line is drawn in pencil 1 in from the lower end of each strip, and the strips are then thumbtacked to a wooden bar so that the lines are all even. A small piece of lead or other weighting device is fastened to the extreme end of each strip. The bar is then suspended over a tray containing distilled water colored with Kiton Brilliant Red B and lowered until all of the strips are immersed to the 1-in mark (cf Figure 5). The capillary rise in centimeters is measured and recorded at the end of 5, 10, 15, 30 and 45 min. The average reading of the duplicate strips at the 30-min interval is most conveniently used for comparative purposes, although the rate of capillary rise may sometimes be of interest.

RESULTS ——— In addition to absorbency, the samples may be examined for motes, color and residual stiffness.

Statistical studies over a period of several years have shown that the coefficient of variation of the test data is a very acceptable 10%.

Typical data obtained during our early use of this method are shown in Table VI.

Since the first-named material had long enjoyed wide-spread acceptance for this use in the field, we were gratified by this apparent correlation and encouraged to utilize the method in subsequent studies.

However, we were disturbed somewhat when we extended our evalaution to certain nonionics, the economy and efficiency of which had been demonstrated in other scouring operations. For example:

TABLE VI

TYPICAL DETERGENTS IN SIMULATED KIER-BOIL TEST plus 1.5% NaOH and 0.25% TSPP*

0.05% Detergent	30-Minute Wick Rise
	cm
Alkylphenol EO** sulfate	8.1
Low-titer soap	7.3
Sodium alkyl sulfate	4.5
NaOH and TSPP alone	2.0

* 3-hour reflux, goods rinsed and conditioned.
** EO = ethylene oxide.

nonionic A gave a value of 10.9 cm compared with 8.1 cm for our anionic trade standard.

This unexpectedly high efficiency seemed illogical because this type of nonionic is known to be insoluble in dilute caustic at high temperatures. As a matter of fact, nonionic detergents, as a class, exhibit a cloud point above which they tend to go out of solution as a cloud of tiny droplets. Since nonionic A has a cloud point in water of 152° F, (somewhat lower in caustic), it seemed inconceivable that it would remain effective in a test conducted at the boil. It was even more unlikely that it would be effective in an actual kier boil conducted at, say, 240° F.

Nevertheless, a plant trial was arranged. The results obtained were, in a sense, too good. The fabric had been scoured so clean that more than the usual amount of softener was required before it could be napped in a subsequent operation.

In later plant trials, reduced detergent concentrations and lesser boil times were used. The kiered fabric had in all cases a satisfactory degree of cleanliness, absorbency and handle.

With the validity of the simplified test method apparently established, we adopted it as a routine screening procedure.

Since that time scores of potential kier assistants have been evaluated. From this work there evolved a new material having unusual efficiency in this use. This new detergent, which we shall here designate as nonionic C, is considerably more effective than any of the previously mentioned kier assistants. In a typical wick rise test, nonionic C gave a value of 13.3 cm compared with 10.9 for nonionic A. Field tests have since confirmed the validity of this finding.

It should be pointed out that, while a simple test method of this type will allow observation of whiteness, presence of motes and the like, it does not permit evaluation of such factors as uniform wetting of the load and ability to avoid channeling and hot spots in the kier. Such properties are best observed in full-scale tests.

REMOVAL OF DRY AND OILY SOIL

In the foregoing sections we have discussed the removal of natural impurities from wool and cotton. Fully as important an aspect of detergency is the removal of adventitiously acquired soil. The removal of floor dirt and loom stains from piece goods is an example of this type of detergency, as is the every day laundering of wearing apparel.

A major difficulty in evaluating a detergent in such a use is the fact that in most cases the composition of the soil is neither constant nor clearly defined. In approaching this problem, a large number of investigators have devised a variety of artificially soiled fabrics, or soil cloths, only a few of which have attained any wide acceptance. It is not our purpose to compare these many soil cloths, but to point out a few of the factors that must be considered in evaluating detergents through their use.

EFFECT OF SOIL TYPE ——— Many types of soil have been proposed. Carbon black is a common type; iron oxide, graphite, and even floor sweepings have been used. Some workers have classified soils as polar (e g, manganese dioxide) and nonpolar (e g, carbon), and detergents often show a marked specificity in removing one but not the other *(5)*.

Fully as important a distinction may be made on the basis of the amount of oil present in the formulation. Thus, many published oily carbon formulations contain several times as much oil as carbon. A good oil emulsifier, which would ordinarily be effective in removing and suspending such a soil, would not necessarily be useful for removing carbon in the absence of oil.

The following commercially available soil contain relatively little oil: U S Testing, Penn State, Foster D Snell, American Conditioning House; on the other hand, Testfabrics soil is definitely oily.

This is one reason why two different soil cloths will sometimes rank a series of detergents in a different order. A typical example is shown in Table VII, where on oily carbon soil ordinary soap is best, followed by lauryl sulfate, alkylphenol EO and tall oil EO in that order. On the dry soil type, the alkylphenol EO is best, while the other three are essentially equal.

Such a variation in efficiency of a detergent, depending on soil type, was strongly impressed on us some years ago during field trials in a hotel laundry. A polymeric type of nonionic, which had looked good in the laboratory when tested on dry carbon soil, gave excellent detergency on flat white work. But later it failed miserably when used on a load of greasy kitchen towels.

We can see that the choice of soil-cloth type may be very important, and that for complete evaluation of detergency several types must be employed. However, if the soil to be encountered in practice can be adequately characterized, and correlation established between the laboratory and the plant, then a single soil-cloth type may suffice.

Further differences between soil cloths can arise from method of application of the soil to the cloth. For example, the soil mixture may be applied by padding, printing or tumbling in a wash sheel. Probably more important in determining the removability is the previous history of the soil, including the medium from which the soil is applied (e g, water, solvent or emulsion).

The failure of the solvent-applied wool grease experiment (discussed in the section on Raw-Wool Scouring) may have been due in part to the unnatural application medium.

EFFECT OF FIBER TYPE———Compared with the almost infinite variety of soils, the variety of fiber types is relatively limited. Nevertheless, the number of fibers is increasing, and until it has been shown otherwise, we must regard each new fiber or blend as having somewhat different soil-removal characteristics from the others.

In the past, most soil cloths were based on cotton or wool, which were the fibers in largest use. However, one supplier of soil cloth has made available a series of standard soiled fabrics comprising cotton, viscose, acetate, nylon, silk and wool, each soiled to essentially the same degree with the same type of oily carbon soil.*

* Testfabrics, Inc, 55 Vandam St, New York, N Y.

TABLE VII

EFFECT OF SOIL TYPE
Morflow-Ometer*, 125°F, Distilled Water, Cotton Soil Cloth

0.05% Active Detergent	Test Fabrics Oily Soil		U S Testing Dry Soil	
	Reflectance	Rank	Reflectance	Rank
Alkylphenol EO adduct	37.1	3	33.2	1
Tall oil EO adduct	34.9	4	28.1	2
Sodium lauryl sulfate	46.1	2	29.2	2
Sodium stearate	50.0	1	28.2	2

* This device is fully described in the section on Energy Input.

In a typical experiment where swatches of each soil cloth were washed in an automatic washer of the inclined basket type with two detergents———an alkylphenol EO and a tall oil EO adduct, each suitably built ——— certain differences between the fiber types were readily apparent.

The results are shown in Table VIII; the values given represent the per cent return to original whiteness.

It is obvious that the wool is easiest to clean, viscose the most difficult. Strangely enough, cotton and viscose, which are both cellulose, show unequal ease of soil removal.

If we use the data to compare the two detergents, we would say that they are equal on cotton, viscose, and silk, but that the alkylphenol is definitely superior on wool and markedly superior on nylon and acetate.

It should be remembered, however, that these conclusions might be true only for this particular soil type, and that part of the differences attributed to fiber type may actually be due to yarn and/or fabric construction.

EFFECT OF SOIL LOADING———In detergent operations wherein short bath ratios are used, or in standing-bath operations, such as the rayon boil-off, the effects of soil loading are most evident and most important. If the soil content of the bath becomes greater than the soil-removing and soil-suspending capacity of the detergent, loss of detergency and excessive redeposition will result. This may be remedied by increasing the bath ratio, the concentration of the detergent, and/or more frequent discharge of the spent liquor; but all of these possible solutions can result in increased costs. However, if the detergent is selected on the basis of its capacity for the soil in question, certain economies can be effected.

We recognize that the determination of the soil-loading capacity of a detergent has not yet been systematized and fully reduced to practice. Nor have all of the data shown correlation with actual operating conditions. Nevertheless, in our brief attempts to determine soil capacity, we have made some interesting experiments. The first of these was made with several typical detergents on Testfabrics and U S Testing cotton soil cloths. After the detergent efficiency of each type was established, a slurry of bentonite———a colloidal aluminum silicate clay———was added to simulate a dry type of soil, and the detergency again determined. In a like manner U S P mineral oil was stirred into the detergent baths. A large excess (15 of soil to 1 of detergent, by weight) was used in each case.

TABLE VIII

VARIOUS FIBER TYPES IN AUTOMATIC INCLINED-BASKET WASHER
125°F, 75 ppm Water Hardness

0.5% Built Detergent	*Cotton*	*Viscose*	*Acetate*	*Nylon*	*Silk*	*Wool*
Alkylphenol EO	28	20	61	59	70	100
Tall oil EO	28	16	43	36	74	80

Notes: soil cloth is Testfabrics oily carbon printed type. Built formulation contains 5% active detergent.

TABLE IX

EFFECT OF SOIL LOADING AT 15 TO 1 ON DETERGENT
Morflow-Ometer, 125°F, Distilled Water, Cotton Soil Cloth

	Testfabrics Oily Soil			*U S Testing Dry Soil*		
	Reflectance	*Change in Reflectance*		*Reflectance*	*Change in Reflectance*	
0.05% Active Detergent	*Alone*	*Bentonite*	*Mineral Oil*	*Alone*	*Bentonite*	*Mineral Oil*
Alkylphenol EO adduct	37	—2	0	33	—5	0
Tall oil EO adduct	35	0	—1	28	0	—1.5
Sodium lauryl sulfate	46	0	+5	29	0	+1.5
Sodium stearate	50	0	0	28	0	0

TABLE X

EFFECT OF SOIL LOADING AT 30 TO 1 ON DETERGENT
Morflow-Ometer, 125°F, Distilled Water, Cotton Soil Cloth

	Testfabrics Oily Soil				*U S Testing Dry Soil*			
	Change in Reflectance				*Change in Reflectance*			
0.5% Built-Detergent	*Alone*	*Bentonite*	*Mineral Oil*	*Bent† MO*	*Alone*	*Bentonite*	*Mineral Oil*	*Bent† MO*
Alkylphenol EO adduct	40	—6	0	—7	33	—3	0	—5
Tall oil ED adduct	35	0	—5	—5	31	0	—3	—4

Note: Bentonite and mineral oil are 30 to one on active detergent the mixture is 60 to 1.

Table IX shows the effect of these additives on the detergency of the four surfactant types. The detergency of the alkylphenol EO was reduced by bentonite but was unaffected by the mineral oil; for the tall oil EO adduct, the reverse was true. This relationship held for both the oily and dry types of soil cloth.

With sodium lauryl sulfate the bentonite had no effect, but mineral oil produced a distinct improvement. This action is probably due to mutual solubilization and may account for the effectiveness of patented processes relating to the addition of certain amounts of free water-insoluble higher alcohols to this type of product.

Soap, represented by sodium stearate, was unaffected by either soil type.

These results could be quantitatively changed by varying the concentration of the soil or the detergent, and the choice of other operating conditions such as temperature, water hardness etc. But it is doubtful whether the qualitative relationship would be affected.

By this illustration we do not mean to imply that the bentonite or mineral oil are representative of typical soils, but the effect of these materials exemplifies how the capacities of different detergents may vary with the soil encountered.

It may be argued that most detergents are used with builders, and that most soils are a mixture of dry and oily types. To show what can happen in such a case, a proprietary low-foam household detergent based on a tall oil EO adduct was compared with a similar built mixture having an alkyl phenol EO adduct as the active detergent constituent.

The data, shown in Table X, indicate that the detergency of the built tall oil type is reduced by oil, that of the built alkylphenol is reduced by bentonite (as was true of the materials in the unbuilt form), while both types are adversely affected by the bentonite-oil mixture. Thus, a slurry of oil and bentonite does not behave like an oily soil as its physical state would indicate, but rather each ingredient maintians its individual loading ability.

EFFECT OF FOAM———In many detergency operations the presence of foam can be beneficial in that solid soil may be trapped and carried away in the overflow; or the foam may merely serve as an indicator to denote the presence of adequate detergent. However, some operations suffer inconvenience due to overflow of foam; more important, there may be an actual loss in detergency because of the cushioning effect of the foam layer. Home laun-

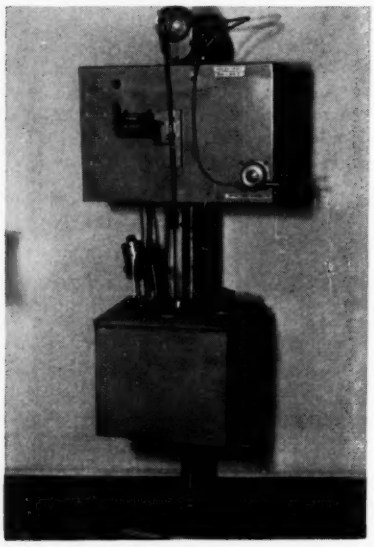


Figure 6
Morflow-Ometer for Detergency Tests

dering is such an operation. This is admittedly a special case, but we should perhaps regard all detergency operations as special cases.

In studying home laundry detergents, a built nonionic mixture was tested in two types of washing machines. One was an automatic machine having an inclined rotary basket, while the other was a non-automatic vertical-agitator type. Suitable ballast loads of clean towels and swatches of Testfabrics cotton soil cloth were washed at 120° F.

Table XI illustrates the effect of foam in these machines. Here the regular nonionic mixture gave moderately high foam in both machines, while the same mixture plus a defoamer produced negligible foam heights. The effect on detergency is striking. In the agitator type, where the fabric load is always submerged and not influenced by foam, both detergents are approximately equal in soil removal (%S), with the defoamed mixture being somewhat poorer when we consider its high redeposition value (%R).

In the inclined-basket machine the fabric is lifted by baffle plates and allowed to fall back into the detergent solution. Here, the cushioning effect of the foam is readily seen. The detergency for the defoamed mixture is almost half again as good as that of the regular higher-foaming mix. This is one reason that manufacturers of basket-type automatic washers generally recommend the use of a low-foaming detergent.

The same principles will apply to any batch operation in a drum-type machine where the force necessary for detergency is cushioned by a blanket of foam. It might be observed, parenthetically, that if this principle is universally true, a man would suffer more injury by falling into a tank of plain water than into a tank of foaming beer.

EFFECT OF ENERGY INPUT——— One factor in detergency work has not been sufficiently emphasized is that of the energy required to perform the cleaning. Primitive people washing clothing on a river bank—beating the fabric on a rock with a smooth stick ——— long ago realized that the cleaning was somehow related to the amount of work expended on the fabric. This is a basic concept of which we all are conscious; we apply it qualitatively in our daily household and industrial detergent operations. Moreover, in some excellent pioneering studies along this line, Bacon and Smith *(2)* have shown by means of the Launder-Ometer that the concentration of detergent required to attain a given level of soil removal is inversely proportional to the mechanical energy applied. Yet, in setting up a laboratory test, the energy level is often overlooked completely.

As was stressed in an earlier section, we hope that our laboratory test will correlate with actual use conditions, which we cannot always duplicate on a small scale. Therefore, in any test device we try to come as close as possible by proper adjustment of the variables; but in many cases the work factor is controlled merely by varying the time of operation of a machine having a fixed motion. In this fashion "all detergents get the same treatment" and most investigators are content. But this procedure can be very misleading when we consider that the work done on the fabric in our laboratory machine may be very different from that applied in the jig, open washer or laundry machine with which we are trying to correlate.

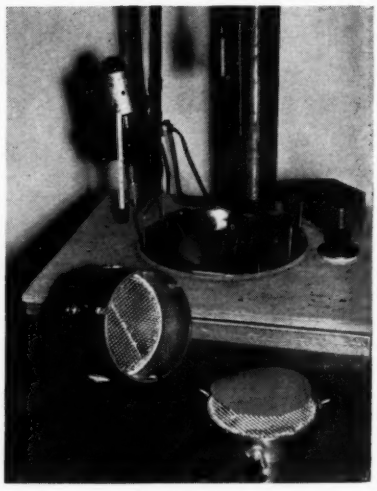


Figure 7
Detail of Morflow-Ometer

In a brief study of this factor we have utilized a device closely resembling the Deter-Meter *(11)*, designed and manufactured by American Conditioning House of Boston, Mass. Our particular version we call the Morflow-Ometer.

This machine, pictured in Figures 6 and 7, consists of a variable-drive mechanism which imparts vertical motion to a washing head over a range of 0 to 200 up-and-down cycles per minute. The washing head consists of a cylinder having a 100-mm disc of soil cloth imprisoned between two screens. The distance between the screens may be set at 1, 2 or 3 cm. This assembly is oscillated vertically in 7 liters of solution contained in a stainless-steel pot surrounded by a constant-temperature bath. As the head moves, the soil cloth strikes the screen at the top and bottom of the stroke, which can be set at 25, 50 or 75 mm. In this manner soil loosened by mechanical action is flushed away by the detergent solution. The impact of the soil cloth against the screen is considerable, and, since it strikes flat, no creases are produced on the soil cloth. Further, a minor rotary motion of the cloth prevents undesirable pattern effects. Our tests are usually run at 2-cm screen spacing, 50-mm stroke for 15 min, and at 120 cycles/min.

In one experiment soiled swatches (U S Testing, cotton) were washed in 0.05% of a nonionic detergent at 140° F with variation of rate of operation of the machine (cycles/min) but with maintenance of the same total number of cycles. A plot of reflectance of the washed soil cloth as a function of total cycles showed a family of curves, one for each rate of

TABLE XI

EFFECT OF FOAM ON DETERGENCY
Testfabrics Cotton Soil Cloth, 120°F

0.1% Active Alkyl-Phenol EO Adduct*	Household Washer Type: Inclined Basket			Household Washer Type: Agitator		
	% S	% R	Inches of Foam	% S	% R	Inches of Foam
Alone	34	2	10	26	2	1
Plus defoamer	52	3	3	23	10	½

* In built mixture: 25% active, 50% STPP, 23% Na_2SO_4 and 2% CMC.

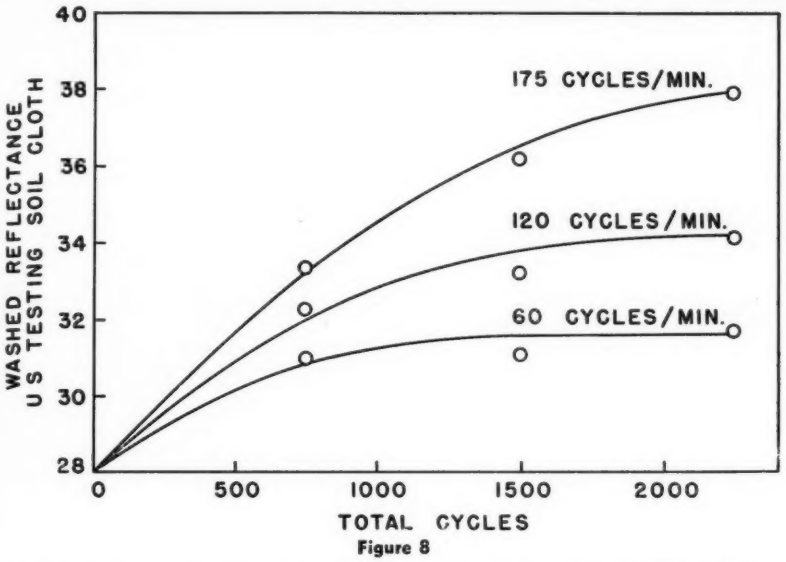


Figure 8

Soil removal as a function of the rate of total energy input of the Morflow-Ometer

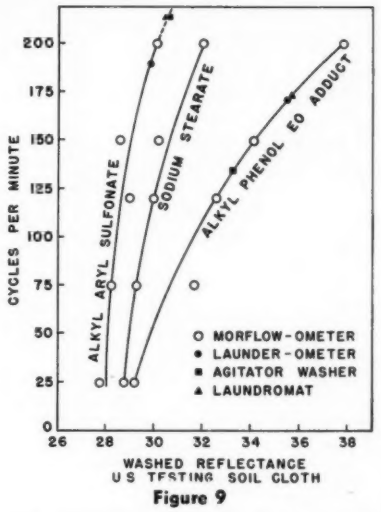


Figure 9

Soil removal as a function of rate of operation of the Morflow-Ometer

operation (cf Figure 8), with the greater cleaning efficiency being obtained at the higher rate. Since at a given point of the X-axis the number of impacts of cloth against screen is constant, it is obvious that the impact energy per stroke (which increases with the rate of operation) is responsible for the greater cleaning efficiency.

In a somewhat different experiment, ordinary soap and two typical synthetic detergents were tested in distilled water at 140° F, again with U S Testing cotton soil cloth. One synthetic was an alkylarylsulfonate (anionic) and the other an alkylphenol EO adduct (nonionic).

All variables were held constant except speed of operation, which was varied from 25 to 200 cycles/min. The duration of each test was 15 minutes, unlike the previous series, where the number of cycles was held constant. The reflectance readings were plotted against cycles/min, as shown in Figure 9.

The resulting curves show that the superiority of the nonionic increases directly with the rate of operation. Thus, when we compare these detergents at 25 cycles/min, we find little difference, but at 200 cycles/min we find that the greater potential detergency of the nonionic has been brought out at the higher rate of operation.

It seems obvious that, in order to characterize detergents adequately, we should know the correct energy level at which to make our comparisons; and this should ordinarily be related directly to the plant operation in which the detergent is to be used. To determine the energy level of a plant machine in terms of a variable laboratory device, we might use the following procedure: attach swatches of soil cloth to fabric in process and measure the reflectance change due to the particular operation under consideration. The same detergent solution from the plant would then be used in the test machine at varied rates of operation to provide a curve similar to that shown in Figure 9. The point at which the reflectance of the plant swatches intersects the curve would indicate the correct rate of operation for the test machine. Then different detergents could be compared in the laboratory at the plant level of operation or rate of energy input. With the work factor thus established, suitable variations in concentration could be tested and the best detergent selected for the job.

Preliminary efforts in this direction have only been partly successful. We have recently attempted to establish energy levels of operation in terms of Morflow-Ometer cycles for our standard laboratory washing procedures in the Launder-Ometer (30 min, 20 steel balls), Laundromat (regular automatic hot cycle), and an apartment-type agitator washer (20-min wash, 10-min rinse). The same nonionic employed in the earlier experiments was used at 0.05% in the three laboratory test machines, and the resulting detergency values were compared with data for the Morflow-Ometer which had been run at varied rates of operation for periods of 15 minutes.

When the reflectance data of the washed soil cloth were plotted on the graph (Figure 9) it appeared that the Launder-Ometer and Laundromat had equal energy levels corresponding to about 170 cycles/minute on the Morflow-Ometer, while the apartment washer showed a milder washing action corresponding to about 135 cycles/minute.

In a similar experiment with the anionic detergent, however, the apartment washer and Laundromat rated some 210 cycles/minute, with the Launder-Ometer slightly lower at about 190 cycles/minute. It would therefore appear that the relative energy levels of any two machines will vary somewhat depending on the detergent being tested.

Thus, even though the principle seems sound, this elementary and preliminary attempt to establish a work factor for one machine in terms of another has given anomalous results. It is too early to state how much of the discrepancy is due to experimental error, and how much to interaction of secondary factors, such as foam or the time of the scouring operation.

For the purposes of the present discussion, it will suffice to say that energy is an important variable, which must be kept in mind—along with soil type, fiber type, foam level, and other variables———in testing detergents.

CONCLUSIONS

In this brief discussion of a very broad subject we have tried to show some of the difficulties that ensue when we endeavor to measure detergent action in terms of a few carefully controlled parameters. No attempt has been made to cover all of the important variables; time, for example, is not considered, although some idea of its effect can be gleaned from Figure 7, wherein time is proportional to the number of cycles. Temperature is also slighted, receiving brief mention only in the section on kier boiling.

Our purpose will have been served,

however, if we have impressed upon you the fact that *detergency* is a single name for a number of different operations, which are related only by virtue of the fact that in each case something is washed off something else with the aid of a third something, which we call a *detergent;* and that, therefore, a variable which is most important in one scouring operation may be relatively unimportant in another. Until, one the basis of much further investigation, the principles underlying a given operation have been clearly elucidated, we must generally rely on an end-use test. This should be selected on a logical basis and accepted only after it has been shown to correlate with actual field experience.

ACKNOWLEDGMENT

Grateful acknowledgment is made to Mrs Norma Faith and Miss Louise Nageley for their assistance in obtaining the data. Appreciation is also extended to the Rohm and Haas Company for permission to publish the information contained herein.

LITERATURE CITED

(1) Adam, "The Physics and Chemistry of Surfaces", 3rd ed, London, Oxford University Press, 1941, p 201.

(2) Bacon & Smith, *Ind Eng Chem* 40, 2361 (1948).

(3) Creeley, *Am Dyestuff Reptr* 27, 180 (April 3, 1939).

(4) Fineman, Paper presented at 122nd National Meeting of Amer Chem Soc, Atlantic City, N J, Sept 16, 1952.

(5) Mankowich, *Ind Eng Chem* 44, 1151 (1952).

(6) McBain, "Advances in Colloid Science, I (Kraemer, Ed), New York, Interscience Publishers, 1942, page 99.

(7) McCutcheon, *Soap and Sanit Chem* 28 No's 7, 8, 9 and 10 (July, August, Sept, Oct, 1952).

(8) *Soap and Sanit Chem* 28, 95-97 (July 1952).

(9) Vold and Koneczy, *J Phys and Colloid Chem* 53, 1262 (1949).

(10) Wolfrom and Nuessle, *Text Res J* 22, 246-53 (April 1952).

(11) Wollner and Freeman, *Am Dyestuff Reptr* 40, 693 (Oct 1951). (Deter-Meter is a registered trade mark of the American Conditioning House Inc, patent applied for).

Membership Applications

October 23, 1953

SENIORS

Ira J Altman—Pres of textile converting, Cavalcade Fabrics, Inc, New York, N Y. Sponsors: W G Helmus, H Moore.

Julian Berch—Research associate, Harris Research Labs, Washington, D C. Sponsors: D Frishman, A E Brown.

Robert M Gregg—Commodity specialist (Hard & Bast Fibers & Mfrs), U S Tariff Commission, Washington, D C. Sponsors: C W Schoffstall, F Gonet.

Donald G Schulman—Textile technologist, assistant converter, Cameo Fabrics, Inc, New York, N Y. Sponsors: C M Pozzi, M F Davis.

Joseph A Truitt—Head of Mechanical Develop Branch, Textile Research Dept, American Viscose Corp, Marcus Hook, Pa. Sponsors: J A Woodruff, I H Welch.

JUNIOR

Charles T Burgess—Salesman, Emery Industries Inc, Cincinnati, O. Sponsors: J W Swiney, N N Touchette.

ASSOCIATES

Harvey C Bullock—Chemist in chg of Washability Lab, Lever Bros, Toronto, Ont.

Mary L Cowan—Instructor in textiles & clothing, Ohio Univ, Athens, O.

Edwin G Eyerly—Quality control & public relations, Cranston Print Works Co, New York, N Y.

Edward A McCafferty—Chief Chemist, National Marking Machine Co, Cincinnati, O.

William L Milheim—Southeastern sales repr, Celanese Corp of America, Chem Div, Charlotte, N C.

STUDENT

Marvin J Moster—Philadelphia Textile Institute. Sponsor: W H Hughes.

APPLICATIONS FOR TRANSFER TO SENIOR MEMBERSHIP

Arthur J Andrews
Daniel J Ardito
Jones H Blakely, Jr
George A Caron
Milton Charatz
Frank Cutter
Donald B Deaton
Frederic K Gammons
Julian M Goldston
William B Guerrant
James E Kerr
Louis C Kolodny
Joseph J McGuinness
E Floyd Pierce, Jr
Shirley L Robey
Basil Schneeweis
Edward W Teague
Zaven S Touloukian
Norman F Young

ONE HUNDRED AND EIGHTY-EIGHTH COUNCIL MEETING

September 17, 1953
Conrad Hilton Hotel, Chicago, Illinois

THE Council held its 188th meeting in the Conrad Hilton Hotel, Chicago, Illinois, on Thursday morning, September 17, 1953. Present were President J Robert Bonnar presiding; Arthur T Brainerd, Arthur W Etchells, Samuel L Hayes, and George O Linberg, vice presidents; Albert E Sampson, treasurer; Leonard S Little, chairman of the Executive Committee on Research; William D Appel, Carl Z Draves, Henry F Herrmann, C Norris Rabold, and P J Wood, past presidents; Edward B Bell, Elmer E Fickett, Frank J O'Neil and Sawyer F Sylvester representing Northern New England; Raymond W Jacoby, Thorwald Larson, Edward W Lawrence and Alden D Nute representing Rhode Island; Raymond J Carey representing Western New England; Irving W Feyler, Jr representing Hudson-Mohawk; Charles W Dorn, Herman E Hager, Weldon G Helmus, Patrick J Kennedy, Paul J Luck, James J Marshall and Henry L Young representing New York; Carleton T Anderson, Onslow B Hager, Ernest E Rettberg, Jr, Thomas J Scanlon, Percival Theel and Frederick V Traut representing Philadelphia; Walter M Scott representing Washington; Harley Y Jennings, Joseph Lindsay, Jr, Raphael E Rupp and R Hobart Souther representing Piedmont; C Russell Gill and H Gillespie Smith representing Southeast; Glenn R Bellamy representing South Central; Arthur I Hultberg, Elliott Morrill and Alfred J Olson representing Mid-West; Kenneth H Barnard and Eric W Camp of the Committee on Conventions; George L Baxter of the Corporate Membership Committee; William A Holst of the Committee on Constitution and Bylaws; Ernest R Kaswell; J Edward Lynn; T Howard McCamy; George H Schuler and Glenn D Jackson Jr of the Publicity Committee; and Harold C Chapin, secretary.

The Secretary's report of the 187th Council meeting and financial report of September 1, and the Treasurer's report for the fiscal year ended July 31, 1953, were accepted. Mr Moorhouse's resignation from the office of treasurer, as of that date, was accepted. In recognition of his service in that office from the year 1932, as well as in other capacities from organization of the Association, he was elected treasurer emeritus. Albert E Sampson, having served as acting treasurer from August 1st, was elected treasurer.

Expenses on research account for grey

scales, and on the Vat Dyeing monograph, in excess of the budget for fiscal year just ended, were approved. Appropriation was made for mailing these books in the current fiscal year.

Mr Little reported the publication of Association work for the Quartermaster on O D 7, under the title, "The Influence of Preparation and Method of Dyeing and Finishing on the Color and Colorfastness of Vat Dyed Cottons", by Rizzo and Bailey. This was released by the Department of Commerce, Office of Technical Services, as Textile Series Report 69. An illustrated bulletin entitled "AATCC Research in Action" has been issued, with particular view to solicitation of corporate memberships. Mr Bonnar's Quartermaster-Air Force Wool Dye Committee is working on six standard shades, and will probably increase that number. Mr Holst is organizing a committee to review the Stoving Test. Mr Babey and Mr Seifert are continuing work on fading under sunlight and comparisons with the Fade-Ometer. The Hotel Association is being supplied with tests of the various materials which its members use. The short gas fading test has been found to correlate well with the standard test. In I S O work more than twenty methods and tests have been submitted to all countries for recommendations.

For the gain in corporate membership income shown in the secretary's report for the last fiscal year Mr Baxter gave particular credit to the New York, Philadelphia and Mid-West Sections. The gain in members was much greater than that in dues, indicating the extra effort necessary to obtain additional funds. More, he hoped, could be obtained from present members.

Professor Theel announced that the 1953 Year Book was about to be mailed to all members.

Mr Schuler expressed appreciation for better co-operation than previously, between authors and Technical Program Committee, in getting papers in advance of presentation at the Convention. He opined that results would be apparent in earlier publication and better publicity.

Mr Barnard stated that the Council had approved the Bylaw amendment pertaining to the organization of his Convention Committee. Mr Camp expressed appreciation for the help to his committees from large paid registration in advance of the convention. Mr Gill reported plans already under way for the four-day convention beginning on September 15, 1954 in the Atlanta Biltmore. Mr Jacoby reported cordial responses from other organizations invited to participate in the Perkin Centennial Convention of 1956.

For the Committee on New Personnel, Mr Wood reported that further progress would have to await the Council's decision as to what funds should be raised, presumably through increase in dues. To consider this, the President asked the four Vice Presidents to consult with Mr Wood's Committee and the Chairmen of E C R and T C R, and to report through Mr Hayes at the November Council meeting.

Presented by Mr Etchells, with approval of his Committee, each of the following was elected to the class of membership indicated:

CORPORATE

Jefferies Processors, Inc Regal Chemical Co

SENIOR

Anderson, W
Asai, M
Auclair, G E
Babb, E L
Bowman, R H
Briere, H E
Clark, E J
Cook, J C
Culp, J M Jr
Dean, J
Dean, R E
Dewing, J T
Ely, L C
Emerson, J H
Ferguson, J
Ford, J M
Frost, R W
Garces, G A
Hansen, E R
Hays, J R Sr
Hoyt, L F
Hudson, M H
Hurka, V R
Jenkins, R F
Johnson, W
Kataoka, K
Kawada, E
Kurokawa, S
Koppelman, M D
Lague, J C
Leath, G F Jr
Linton, G E
MacMillan, M K
Manfra, N M
Miller, G Deb
Morita, I
Nakagawa, K
Nicholson, A P
Ohata, K
Orita, T
Otten, J
Rudnick, E S
Russon, W S
Sacrinty, P G Jr
Sakazaki, K
Sasaki, C
Schorr, D T
Stauber, M A
Sumi, S
Talley, J C
Tanaka, I
Tarigo, A L
Towey, F H
Vega, J F
Webb, E H
Wowk, A
Yoshida, Y

JUNIOR

Ambry, P J
Carradori, E F
Crawford, D B
Gallo, B A
Vogt, H
Williams, R M

ASSOCIATE

Arnold, K
Carvalho, H
Cowing, R I
Doyle, J A
Hagens, H C
Hamiter, G H
Hellman, D H
Kraft, F A
McCorkle, M
Sherwood, N H
Sprague, O A

STUDENT

Arsuaga, M E
Hurt, F J Jr
Levy, J B
Tjhung, H T

Transferred from other classifications to Senior

Baker, C S
Bechard, R W
Feyler, I W Jr
Hargrove, R W
Helfand, S
Hoyle, A G
Hurt, R C
Inabnit, W D
Iannarone, J J Jr
Kantner, G C
McCulloch, G B
McNulty, H W Jr
Miranowicz, J J
Moore, C P Jr
Peabody, R A
Pennie, R N
Roeper, W H
Rosenbaum, J H
Stilwell, J R
Smith, M H Jr
Touchette, N W

Respectfully submitted,
H C CHAPIN,
Secretary

SECRETARY'S FINANCIAL REPORT—SEPTEMBER 1, 1953

Received and transmitted to treasurer,	*Applications*	*Dues, regular & reinstate*	*Dues, Corporate & Sustaining*	*Miscellaneous*	*Totals*
August 1, 1952 to May 11, 1953..	$4,287.50	$44,071.50	$47,827.50	$12,953.12	$109,139.62
May 11 to July 31, 1953.....	708.50	331.00	800.00	16,626.73*	18,466.23
Total for fiscal year.....	4,996.00	44,402.50	48,627.50	29,579.85	127,605.85
Year ending July 31, 1952 for comparison	5,042.50	42,853.25	44,832.50	17,328.02	110,056.27
August 1 to September 1, 1953..	313.50	101.50		8,742.06**	9,157.06
Leaving deposited by treasurer with secretary.....					3,951.73
				*	**
Miscellaneous items					
Dividends and interest.....				518.55	110.00
Reporters and reprints.....				35.95	20.15
Launder-Ometer royalties				170.00	
Light fading cabinets.....				300.00	
Grey scales				22.50	
Year Books				379.50	36.50
Crockmeters				648.62	164.36
Crock cloth				18.75	89.05
Multifiber cloth					389.72
Moth cloth					57.50
Water test apparatus.....				124.90	11.60
Dyed standards				268.30	30.00
Knitted tubing				256.00	24.00
Gas-fading units.....				2.00	38.00
Buttons				15.75	
Color transfer charts.....				223.25	15.00
Flammability apparatus					1.00
Colour Index prepayments.....				11,452.00	6,939.88
Analytical Methods				103.50	64.00
Application of Vat Dyes.....				1,935.16	679.50
Cotton skeins					59.80
Standard grease wool.....				27.00	12.00
Royalties, Acceleroter				125.00	
				$16,626.73	$ 8,742.06

H C CHAPIN,
Secretary

Report of New York Section Meeting

October 23, 1953
Rochelle Park, New Jersey

A MEETING of the New York Section was held on Friday evening, October 23rd, 1953 at Kohler's Swiss Chalet, Rochelle Park, New Jersey. A dinner preceded the meeting.

The Chairman, Weldon G Helmus, appointed the following members of a nominating committee to present their selections for three council representatives at the November 20th meeting of the Section:

Henry L Young, Interchemical Corp, *Chairman,*

William A Holst, Jr, National Aniline Division, and

Carl H Brubaker, Standard Bleachery & Printing Co.

The Chairman pointed out that a number of members of the Student Chapter at Fairleigh Dickinson College were present as guests of the Section, together with Herbert R Mauersberger, head of the textile department at the College.

The Chairman urged all those who had not done so to send in their ballots for election of National Officers of the Association.

Dr Jack Compton, Technical Director, Institute of Textile Technology, Charlottesville, Va, presented a paper entitled "New Textile Fibers with the Structural Elements of Natural Cellulosic Fibers" which was illustrated with slides.

The attendance was about 175.

Respectfully submitted,
NORMAN A JOHNSON
Secretary

PHOTOS OF OCTOBER 2nd MEETING WESTERN NEW ENGLAND SECTION

(See Secretary's report on page *P720* of previous issue)

Pictured at the lower left are the officers of the Western New England Section for the forthcoming year: L to r: Rudolph C Geering, Sectional Committeeman; Raymond J Carey, Councilor; Nathaniel J Glade, Secretary; Albert H Rant, Sectional Committeeman; Arthur S Nyquist, Chairman; Andrew W Goodwin, Sectional Committeeman; Socrates V Vaniotis, Vice Chairman; and Emil A Vitalis, Sectional Committeeman. Thomas J Gillick, Jr, Treasurer, was not present at the time the photo was taken.

ABSTRACTS

Scouring Considerations in the Wool Industry

Anon, *Fibres (Natural and Synthetic)* 14, 306-12, September, 1953.

Fundamental studies of detergency have to cover very wide variations of conditions ranging, for example, from hand washing, where soiling may be relatively slight but the concentration of detergent used enormous, to industrial processes where large amounts of contaminants must be removed with the utmost efficiency of detergent. Raw wool scouring is an extreme example of the latter type, since in a normal-sized scouring train at least a quarter of a ton of contaminant may have to be disposed of per hour. In this article an account of the technology of the wool scouring process is given, and an assessment made of the extent to which research has cast new light on the operation.

Among the many subjects discussed by the author are the mechanical arrangements commonly used for moving the wool along the bowls; the desuinting process; the role of detergent and alkali in wool scouring; absorption of alkali by the wool; and the effect of different temperatures.

He concludes that scouring should be satisfactorily carried out in three bowls, but emphasizes that ideal scouring conditions call for continuous control of the conditions in each of the bowls, including temperature, soap concentration, especially alkali concentration, and grease content of liquor and wool after each squeeze, to see that each part of the train is fulfilling its proper function. He stresses that the aim should be to maintain constant and uniform conditions, and this is better done by controlled, continuous, metered additions of reagents than by the addition of large excesses at irregular intervals. He believes that the first bowl, if properly run, can do the greater part of the washing; it should be at pH 10 or 9, according as soap is or is not added.

The following three subjects for further research are recommended as being of immediate practical interest: the use of caustic alkalis in the first bowl; improved washing from more frequent squeeze rolls; and the suppression of detergent loss from internal water-in-oil droplet formation.

(This article was supplied by the Scientific and Technical Department of the International Wool Secretariat in London.) —WHC

Radioactive Isotopes in Roller Printing

W Meitner and H B Hampson, *J Soc Dyers Colourists* 69, 283-4, August, 1953.

Of the many problems which beset the printer it is probable that the one which has caused more anxiety and loss than any other is that of color soiling.

Although the doctor blade attached to each print roll continuously scrapes the roll free from color, except where the latter is held in the engraving, it leaves on the plain surface a fine film, which acts as a lubricant for the doctor edge. The transference of part of this film to following rolls helps in the build-up of contamination or soiling.

The colors are arranged in the printing machine so that, as far as possible, in no case will a color be capable of visibly contaminating the color following it; but it is not always possible to provide for this. The print cloth and the back-grey carry forward surplus color which, by pressure of the nips, is transferred to the surface of the following roller, and from there, via the furnisher, to the color box. This is the chief source of contamination.

If there is sufficient contamination to cause visual soiling, the printer is placed in a very difficult position. In this case he has to rely on skill and experience to know when to take action, which he does by removing part of the color from the box and replenishing with fresh color.

It would appear that there is a need for a more positive method of control, and the use of radioactive labelling seems to be the answer to this difficult problem. By such a method it is possible not only to detect contamination but also to measure it continuously and with accuracy.

The labelling technique depends upon the use of radioactive isotopes. These are unstable elements which decay spontaneously with the emission of α, β, or γ rays. Modern nuclear physics has made possible the preparation of these isotopes in the atomic pile. Phosphorus 32, which is found to be most suitable for labelling in this technique of soiling detection, is prepared by bombarding phosphorus 31 with neutrons. Some of the atoms of phosphorus 31, under such conditions, capture one neutron and become atoms of phosphorus 32, which emits electrons (β rays). These electrons are capable of ionizing air, or other inert gas, converting it from a nonconductor to a conductor of electricity. Advantage is taken of this in the construction of the Geiger counter, which forms the measuring unit of the soiling-detection instrument.

The printer knows beforehand when he has a combination which is dangerous from the soiling point of view. He also knows which is the sensitive, and which the offending, color. A calculated amount of the radioactive isotope is added to the offending color, and the growth of contamination in the sensitive color is measured by a Geiger counter immersed in the color box and attached to a meter that has been previously calibrated in terms of soiling level. The printer reads the meter, which registers nil at first, and when the needle approaches the danger line he takes action by removing contaminated color and replacing with fresh material.—WHC

Flame-proofing Cellulose Acetate; Possibilities of a New Process

Anon, *Dyer* 110, 277, 279, 281, August 21, 1953.

Perhaps more than any other fiber-forming material, cellulose acetate offers the chance of easy chemical reaction. The commercial fiber is manufactured by the preparation in the first place of the cellulose triacetate, in which *all* the hydroxyl groups of the cellulose are esterified, and then by the partial hydrolysis of this triacetate back to a stage which corresponds to about 2.3 acetyl units per glucose residue. A hydroxyl group which has already been acetylated and then hydrolyzed is likely to be easily esterified again. This affords a suitable means of introducing new chemical groups, which may have special functional properties, into the cellulose acetate molecule.

The latest of the many modifications to the properties of cellulose acetate which can be brought about in this way is that of flameproofing. This property is gained by the introduction of a chloralkyl phosphate ester group.

Flameproofing properties are known often to be associated with the presence of chlorine and phosphorus in the molecule. Fibers which contain a very high proportion of chlorine are intrinsically non-flam: such are Saran, a polyvinylidene chloride, Rhovyl and PCU, polyvinyl chlorides, and Pe Ce, an after-chlorinated polyvinyl chloride. Phosphates have predominated among the various salts that have been recommended and which have, indeed, been used on a wide scale in the flameproofing of cotton and rayon fab-

rics; they have been effective but have always been subject to the outstanding disadvantage that they could be washed out.

The simultaneous introduction of both chlorine and phosphorus into the cellulose molecule therefore represents a new and interesting approach to the problem of producing a flameproof rayon, and the method has the outstanding advantage that the chlorine and the phosphorus are both chemically *combined* with the cellulose acetate. They will not wash out and will withstand any cleaning or laundering procedure. The new process is covered by British Patent 694,217 of the Celanese Corporation of America. The chemistry of the reaction is described in detail.

The general conclusion to be drawn from the patent specification is that a way has been found of making a cellulose acetate which contains a small quantity of a ' is-chlorethylene phosphate radicle, that this mixed ester can be dissolved in acetone and spun therefrom, that it has a reasonably high softening point of 210° C, and that it is nonflam. This represents a considerable achievement, and the author expresses the hope that development and production of this so badly needed nonflam rayon will quickly follow.—WHC

New Dyeing Processes for Acetate Rayon Materials

A J Hall, *Textile Mercury & Argus* 129, 328, 330, 333-4, August 21, 1953.

A considerable amount of interest has always been associated with the application of vat dyes to acetate rayon with the idea of producing shades faster than those which can be obtained by the use of the so-called acetate rayon dyes, which consist of aqueous dispersions of pigments insoluble in water but soluble in the secondary cellulose acetate of which ordinary acetate rayon is made.

There is one disadvantage about the application of vat dyes to acetate rayon by the methods commonly used in dyeing vat shades on cotton and other cellulose fiber materials—the dye liquor is required to e alkaline to maintain the leuco form of vat dye in solution, and this alkalinity is sufficient to produce saponification of the rayon fibers. This saponification is not strictly a disadvantage from the viewpoint of dyeing, but it can result in a loss of weight and a depreciation of handle which is not generally acceptable.

Recently it has been proposed (British Patent 692,934) to produce improved vat dyeings by using a process in which only a weak alkali is employed, so that the degree of saponification is strictly limited and therefore acceptable. The basis of this new process lies in the use of an organic alkali, and also in the use of a steaming process for assisting reduction and fixation of the vat dye which is shorter than the ordinary dyeing procedure and thus less liable to produce saponification. Actually the new process appears to be a development of an earlier one (British Patent 635,310).

In the new process the acetate fiber may be padded with the following typical liquor (for Indigoid dyes):

	parts
vat dye	15
Formosul	10
sodium thiocyanate	15
monoethanolamine	10
water	25
30% British gum thickening	15
urea	10

The fabric is then dried, steamed for 40 minutes at 104° C, and washed. The dyeing is oxidized with sodium percarbonate at 60° C, washed and soaped. The resulting dyeing is said to have very good fastness to rubbing, and the degree of saponification is strictly limited. A higher proportion of monoethanolamine is required for applying anthraquinone vat dyes. In this case somewhat more saponification takes place.

The author also describes another similar dyeing method and several new acetate dyes patented by the Celanese Corp. —WHC

Vicara

Anon, *Textile Age* 17, 54-7, September, 1953.

This fiber, manufactured by the Virginia-Carolina Chemical Corp, is made from zein, a protein extracted from the kernel of corn. It is processed in the form of a continuous pale yellow tow, or if staple fiber is desired it is cut to any lengths from "0.5 to 6". Bleached Vicara is also available.

Vicara has excellent resistance to acids, including concentrated hydrochloric acid and 70% sulfuric acid. The fiber may be carbonized without danger of deterioration. It will withstand the action of dilute caustic alkalis, but not kier boiling.

According to the author, the inherent characteristics of Vicara make it a wonderful asset in blends. Its softness is particularly desirable. It adds suppleness and draping qualities to rayon; warmth and absorptiveness to nylon; softness to wool. Fabrics composed of 100% Vicara are soft and full.

The elasticity of the fiber is comparable to animal fibers. Its tenacity (dry) is 1.10 to 1.20 grams per denier. Elongation is 25 to 40% in the dry state and 30 to 50% in the wet state, depending on the type. At 1% elongation the modulus is .32 grams per denier. The specific gravity is 1.25. Moisture regain at 65% R H and 70° F is 10%.

Vicara has excellent resistance to dry heat up to 400° F. Its softening point is about 475° F. Because of its high heat resistance, no special care is required when ironing. It is less flammable than the cellulosic fibers; the burning rate is slow, slightly faster than wool. When burning it gives off the characteristic odor of burning protein, similar to wool and silk.

The fiber is both moth and mildew resistant. It is non-itching and has not been known to cause an allergy. It can be readily laundered and drycleaned.

Vicara is relatively easy to dye. Solid shades are obtained with acid colors on blends with wool by using selected migrating types, by adjusting the pH of the dyebath, and by slightly raising the temperature (between 200 and 212° F). Up to 200° F the wool will dye to a darker shade. Vicara-wool blends are also satisfactorily dyed with selected chrome colors, using the top-chrome method. The same is true of metallized dyes.

Vicara-nylon blends can be dyed with acetate colors, metallized dyes, direct, neutral and acid colors, and chrome dyes.

The softness, absorbency, shrink-resistance, and moth and mildew resistance of Vicara provide valuable qualities in blends of acrylics and other man-made fibers.—WHC

Acrylic Resins in Textile Processing

A C Nuessle and B B Kine, *Ind Eng Chem* 45, 1287-93, June, 1953.

Until a few decades ago, the only polymeric materials employed in the finishing of textiles were naturally occurring substances such as rosin, gelatin, and various starches and gums. Today, however, the industry utilizes a large variety of synthetic polymers to achieve effects not possible with the natural products.

One group of synthetics which enjoys such use is the acrylics family. This is a subdivision of the unsymmetrically substituted ethylene class, and includes both acrylic and methacrylic acids, and their salts, esters, amides and nitriles.

The relationship between chemical structure and physical properties of the various acrylic polymers is described by the authors.

There are four general methods of applying acrylics to textile materials: from water solution; from solvent solution; as emulsion polymers; and as monomers. The water-solution and aqueous-emulsion methods are most often used.

Emulsion polymers of the acrylic resins can be used to modify the hand and feel of a fabric. The result may be a full, heavy hand or a stiff finish, depending on the product used. It is necessary to fuse the dispersed particles to obtain proper cohesion. A delustering effect, if desired,

may also be obtained.

Acrylic polymers, precipitated from the dispersion and dissolved in a suitable solvent, will dry down to a continuous film. The resulting finish depends again on the choice of product used. The drying temperature is much less critical here.

Among the chemical properties of the acrylics is resistance to aging, specifically to changes resulting from heat and light. The authors refer particularly to the excellent aging properties of vinyl acetate-acrylic mixed polymers.

Washing a fabric which has been treated with a moderately hard acrylic emulsion generally lowers the resin content by less than 10 per cent, but the stiffness may be considerably reduced. Hot pressing helps to restore much of the original stiffness.

Other uses of water-insoluble acrylics include a treatment of canvas water bags to prevent leakage but at the same time permit slow diffusion of water to the surface, and backing of rugs to bind the pile fibers and prevent the rug from slipping on a polished floor. They are also used as binders for nonwoven fabrics and for pigments to obtain combination bodying-delustering effects. Coated fabrics may be prepared having excellent resistance to weathering.

The water-soluble acrylics, applied to cellulosic fabrics, impart a crisp starch-like finish. They are not widely used for finishing because of their solubility, but have considerable use in the sizing of nylon warps, due to their excellent adhesion. Sodium polyacrylate is also used as a thickener in printing pastes, and as a dispersing agent and protective colloid.

The authors also discuss various ways in which acrylics may be applied in monomer form, particularly on wool.

Numerous tables and references to the literature are included.—WHC.

Cotton and Nylon Textiles on Everest

Anon, *Dyer* 110, 44, July 10, 1953.

Behind the conquest of Everest lies a story of teamwork: teamwork in the design and production of equipment as well as of men and organization. Every detail of the clothing and other textile gear taken by the Everest expedition was planned with meticulous care.

The fabric chosen for the important role of the tents and outer windproof clothing was composed of a cotton warp and nylon filling. It was completely windproof, strong, light in weight, and snag-resistant, and the water penetration was nil.

A brilliant blue was chosen as the best color for the parka suits because blue absorbs heat and has good resistance to cold, besides being easily seen against the snow.

Nothing was forgotten in the construction of these outer windproof parka suits, even down to the little tab on the back of the jacket through which the cords of the over-mitts were threaded. By this means, the mitts could be slipped off easily from the down-filled ones worn underneath without fear of losing them. These over-mittens were made from a heavy Ventile all-cotton fabric.

To wear beneath the parkas, the men were provided with a light but warm cotton down-filled climbing suit.

The majority of the tents made from the same fabric as the parkas were of two colors, brilliant yellow, and a glowing orange-pink. These cheerful shades act as a morale builder and make them quickly identifiable in the snow. The other tents were made from a very fine and light all-cotton cloth. Some of these were colored pink, denoting that they were nylon-lined; others were yellow.

Inflatable mattresses made for the expedition were constructed from a rubber-proofed light cotton cloth woven from Egyptian yarns.

Sleeping-bags were down-filled and covered with a wax-proofed showerproof fine cotton cambric and interlined with a cotton sateen. The ground sheets were made from a special rubberized cotton sheeting. This was also used to line the rucksacks, made from fine Egyptian cotton.—WHC.

New Fibers——New Problems: Modified Processes for the Dyeing of Knitwear

J A Potter, *Textile Mercury & Argus* 128, 963-6, May 29, 1953.

The use of new fibers, particularly in the hosiery industry, has created problems in all stages of processing, and many of these have to be borne by the dyer and finisher. However, as a result of research work by dye and fiber manufacturers, existing dyeing processes have been modified by chemical, physical, and mechanical means, so that a wide range of shades of adequate fastness can now be obtained on most of the new fibers.

Ardil and Fibrolane, the speaker said, liberate formaldehyde in dyeing, which has a detrimental action on certain wool dyes, particularly chrome dyes. Prechroming will overcome this defect, he stated.

Neolan dyes may be applied to Ardil without any other addition to the bath, making use of the acid present in the fiber. In dyeing unions of Ardil and other fibers this acidity must first be neutralized.

Dynel can be dyed with disperse (acetate) dyes. The fastness of these dyes to washing on Dynel is much better than on acetate rayon or nylon, but the fastness to light is somewhat poorer. Blues on Dynel are not sensitive to gas fumes. Selected acid dyes may be used when better fastness to light is needed; an organic swelling agent and a cuprous salt should be added for medium and heavy shades. A heat treatment after dyeing (e g, boiling for ½ hour in common salt solution) is recommended to restore the luster of dynel. Temperatures over 120° C must be avoided.

In dyeing unions of wool and Dynel, tone-in-tone effects are obtained with most wool dyes, the Dynel being lighter than the wool.

The speaker recommended acid and other wool dyes for nylon staple in men's half-hose in preference to disperse dyes on account of their superior fastness to washing. In dyeing mixtures of nylon and silk, disperse dyes, such as are used on all-nylon hose, dye the nylon but also stain the silk. Both fibers are dyed with certain acid dyes and the new Cibalan range. The latter have also been used satisfactorily on mixtures of nylon and wool.

In dyeing Terylene (Dacron), very little swelling occurs in water and dyes are absorbed with difficulty. Certain organic compounds (e g, paraphenylphenol) act as swelling agents and permit the production of heavier shades, but the speaker warned that they have disadvantages, such as toxicity, difficulty in removal after dyeing, and an adverse effect on the hand of the dyed goods. The disperse dyes are faster to washing on Terylene than on acetate or nylon, and the Blues are unaffected by gas fumes.

The speaker dealt briefly with Orlon acrylic fiber, which has good resistance to acids, light, and high temperatures, but a very low water take-up, even lower than Terylene; consequently dye absorption is low. The addition of swelling agents to the disperse dyes makes little difference, according to the speaker. He referred to the successful attempts in the U S to dye Orlon and other nonabsorbing fibers at temperatures above the boil, but stated that it would be difficult to construct a hosiery machine for such a purpose.—WHC.

Those Red Tunics

Anon, *Dyer* 109, 99-101, Jan 23, 1953.

For 250 years—from Cromwellian times until the end of the last century—red was the tunic color of the greater part of the British army not only for ceremonial and "walking-out" dress but also for uniforms worn on active service.

It was a change in fashions not of dress but of warfare which led to the first lowering of the status of red. It is a highly visible color. This did not matter very

much when armies habitually fought each other at close quarters, but technical improvements in firearms and artillery, making it possible for an army to give battle at a distance from the enemy, made the military mind increasingly conscious of the value of camouflage. During the Indian mutiny, red coats for native soldiers were discarded in favor of Indian-made cloth of khaki ("dust-colored" in Hindustani). Whether this policy was dictated by a belief in the superiority of khaki or by a scarcity of red cloth is not clear. Whatever the reason, the advantages of the color were appreciated and its use became fairly general for British troops serving in India and other tropical climates, although red still prevailed at home. Khaki was worn by the American army during the Spanish-American war and by the British army in the Boer war. The tactical advantage of the color is said to have become finally and universally recognized after the Russo-Japanese war, and by the outbreak of the first world war it had become the usual color for service uniforms.

In Britain, however, red still remained a cherished tradition for walking out and ceremonial dress, and it was not surprising therefore that there were protests recently when the Army authorities decided to deprive all units but the Foot Guards and the Life Guards of the Household Cavalry of their red, and provide them with a cheaper cloth in blue.

The writer brings out that the main reason for the change is the high cost of red cloth, particularly the material used for "No. 1 Dress" which is dyed with Cochineal. It is explained that this dye, if properly applied, is very fast both to light and to bleeding in water; the test for Cochineal is very simple and rapid, and therefore in continuing to specify this form of dyestuff those responsible have avoided the necessity of carefully testing cloth to make sure that the dye is satisfactory, and to ensure also that the color that has been used is one which is fast to bleeding.

The dyeing of Cochineal involves a long and tricky process, and the cost of the dye and of the ancillary chemicals is high. Cochineal also behaves somewhat like litmus, in that with acid it turns yellow but with alkali it will go purple.

After discussing the relative merits of Cochineal and Acid Reds for use on the army fabrics involved, the writer asks: "Does it really matter whether the color is red or blue? Those who regret the decay of tradition and the loss of anything that adds color to the drabness of the English scene may console themselves with the thought that our great ceremonial occasions—the State openings of Parliament and the Trooping of the Color, for example—will still be enlivened by the scarlet tunics and cloaks of the Guardsmen."—WHC.

Cottons as Ion-Exchangers

Anon, *Canadian Textile J* 70, 75, May 22, 1953.

A potential new use for cotton has been found in the ion-exchange field. Certain forms of chemically modified cotton are suitable for use as ion-exchangers in laboratory purifications and in certain industrial processes—for the removal of basic or acidic groups from chemical solutions, dispersions, gases, and the like.

The discovery that specially prepared cottons enter into ion-exchange reactions was made by members of the Southern Regional Research Laboratory (U S D A) in New Orleans, La, in research on tailoring cotton for specific requirements in particular uses. These researchers found that cottons they had altered by introducing certain reactive chemical groups to replace hydroxyl groups in the cellulose molecule exhibited, among other new properties, the ion-exchange capacities.

Any practical uses that may be made of the cotton ion-exchangers will probably be based on their unique physical form. The availability of ion-exchange fabrics introduces an entirely new concept into this field. Only granular-type resins are at present used in commercial ion-exchange processes. The fabric exchangers, because of the greater ease in handling and their re-use possibilities, would be more suitable than the resins for a number of specialized uses.

Phosphorylated cotton (made by the action of phosphoric acid and urea on cotton) and sulfoethylated cotton (made by treating with 2-chloroethylsulfonic acid) are good cation exchangers. Partially carboxymethylated cotton (prepared by treating with chloroacetic acid) and the succinic acid half ester of cotton (made by the action of succinic anhydride in dry pyridine) are cation-exchangers of the weak acid type.

Another cation-exchanger is produced by partly esterifying cellulose with polyvinyl alcohol that has already been partly esterified with orthophosphoric acid.

A good anion-exchanger is aminized cotton (made by treating with 2-aminoethylsulfuric acid; better anion-exchangers are aminized-iminized cotton (made by the action of ethyleneimine on aminized cotton) and quaternary aminized cotton (made by the action of methyl iodide on diethylaminoethylated cotton).

Although evaluation showed that the acidic and basic strengths of most of the ion-exchange cottons are considerably below those of the resins now used for the purpose, the present capacities would be adequate for some of the suggested uses.

Work by the Southern Laboratory chemists in this field of research is reported in the following publications: *Industrial and Engineering Chemistry* 44, 2187 (1952) and *Textile Research Journal* 18, 42 (1948) and 20, 617 (1950).—WHC.

The Dyeing of Effect Threads

L Biggins, *Textile Recorder* 71, 100, July, 1953.

In the worsted trade, effect threads (of cotton, rayon, acetate, etc.) are frequently introduced into suitings and other cloths of good quality. Cellulosic threads are usually dyed with vat, azoic, and sulfur dyes in order to obtain the necessary fastness for the subsequent cross-dyeing.

Acetate rayon threads are sometimes dyed with vats, but the application is not easy. More recently azoics have been used, the naphthol and base being applied together, with subsequent diazotization and coupling.

The use of nylon as an effect thread to withstand cross-dyeing is limited by the ease with which most coloring matters dye it. Nylon is usually dyed with disperse (acetate) dyes, but the fastness is only moderate. Chrome dyes applied by the after-chrome method require the addition of a mild reducing agent to reduce the dichromate ions. With this modification the after-chrome method is recommended for maximum fastness properties.

Vat dyes on nylon have the disadvantage of poor lightfastness, and also have a rather low affinity for the fiber. The application of azoics is limited by a tendency to stain under severe washing conditions.

Package dyeing of nylon has been successfully carried out with acid, chrome, vat, and azoic dyes, according to the author.

In dyeing Terylene (equivalent to Dacron), some difficulty is experienced with heavy shades on account of poor rubbing fastness. To correct this, an aftertreatment is described, consisting of caustic soda, hydrosulfite, and Lissolamine A, applied at 60° C.

Terylene may be dyed on packages, but requires an extra winding process. The yarn is first wound on cardboard cones and is given an initial steam-setting treatment at a temperature equal to or higher than that used in dyeing. This treatment shrinks it, and the cones are crushed, but the yarn is now in a suitable condition for rewinding into soft cheeses for dyeing.

In the woolen trade, by contrast, effect threads serve a different purpose. Here they are generally of wool, and the dyed yarns are subsequently woven together and subjected to carbonizing, milling, etc. —WHC.

• PATENT DIGEST •

PAUL WENGRAF

NYLON RESISTS IN MIXED FABRICS———Synthetic Tanning Agents C, 4, 07

U S Pat 2,623,806
(Geigy A G———Fuchs———Dec 30, 1952)

In this patent, the inventor mentions a process for obtaining nylon resists in acid dyeing through the application of organic sulfonic or carboxylic acids before (or during) the dyeing of wool-nylon mixtures. This probably refers to U S P 2,325,972 (see references below). Such acids are said to have pronounced affinity for the synthetic fiber, thereby partly blocking the adsorption of dyes and acting as leveling agents. It is contended, however, that a true white resist effect cannot be obtained this way.

It has been observed that a mixed condensate of naphthalene monosulfonic acids with dihydroxy diphenylsulfones and formaldehyde (the three components being present at the ratio of

1:0.7—1.5:0.7—1)

can be used for rendering nylon, Perlon L or Perlon U resistant to acid dyeing. The skeins are treated for about 30 minutes at the boil in a 3% solution of this condensate, which is otherwise known per se as a synthetic tanning agent, and then rinsed well. Examples point out that the treated nylon effect threads in otherwise all-woolen textiles remain pure white when the fabrics are dyed with acid or acid chrome dyes. Two-color effects are also within the scope of this invention.

Among the references cited by the Patent Office:

U S P 2,533,100 (Sandoz/1950): immunizing nylon by a treatment with sulfurized phenols of the Thiotan type [cf *Am Dyestuff Reptr 40,* 280, (1951).]

U S P 2,325,972 (General Aniline/1943): using certain organic acids, such as salicylic, benzylnaphthalene sulfonic acid or naphthalene sulfonic acid - formaldehyde condensates, as retarding agents in dyeing nylon, and also as leveling agents in wool-nylon mixtures.

U S P 2,282,264 (General Aniline/1942): using formaldehyde condensates with naphthalene sulfonic acid or with dihydroxy diphenylsulfone as tanning agents.

U S P 2,204,512 (Rohm & Haas/1940): dissolving tanning agents containing relatively water-insoluble aromatic compounds, such as dihydroxy diphenylsulfone, in formaldehyde-naphthalene sulfonic acid condensate.

Brit P 552,015 (Courtaulds/1943) points out that nylon treated with naphthalene sulfonic acids in acid solutions loses its affinity for dyes in general and especially for direct dyes.

IMPROVING WETFASTNESS OF DYEINGS——Peralkylated Polyalkylene Imines C, 4, 02

Brit P 683,251
(Cassella Farbwerke Mainkur———Nov 26, 1952)

This invention concerns itself with direct dyes subjected to an aftertreatment with agents that enlarge the molecular size, i e, by diazotizing, formaldehyde treatment, etc; and also with sulfur dyes that are insolubilized by an oxidizing treatment. Treatments of vat or other direct dyeings that are not substantially altered in their solubility are not affected by the present invention.

It has been observed that the wetfastness of aftertreated dyeings of the aforementioned classes is further improved by an additional aftertreatment with a peralkylated polymerizate of an alkylene imine. (An ethylene imine polymer is subjected to an exhaustive methylation or ethylation with dimethylsulfate or diethylsulfate.) The aftertreatment may be effected either after dyeing or in conjunction with the developing bath. Sulfur dyeings are rinsed and re-oxidized as usual and then treated with a small percentage (0.4-0.6%) of the peralkylated ethylene imine polymer.

Example: a 4% dyeing of Diamine Bronze G (Schultz Index #644) is developed in the cold with an 8% solution of Nitrazol CF Extra (stabilized p-nitro diazobenzene) and aftertreated in the cold with 0.4-0.6% of the peralkylated polyethylene imine.

According to the prior art, direct dyeings may be pretreated with alkylated polyethylene polyamines. (See General Aniline's U S P 2,040,061 (1936) or I G Farben's British Patent 435,388 (1935).) Polyethylene imines are not to be confused with the aforementioned polyalkylene amines. According to *J Organic Chem 9,* 1332 (1944), they are obtained by polymerizing the monomer $CH_2—CH_2$ (NH), by heating or by adding catalysts and are generally useful as resin-forming compounds.

CHLORINATING WOOL——Acid Pretreatment A, 2, 04

Brit P 683,762
(Scholler Brothers Inc———Dec 3, 1952)

This method aims at gaining accurate control of the chemical and physical process during the chlorination of wool. It is claimed that the uniformity of effect is improved, and yellowing and hardening are avoided.

These results are said to be obtained by first treating the woolen fabric in an acid bath to retain 0.4-0.6 (0.49-0.55) milliequivalents of the acid per g of the dried clean wool. Thereafter chlorination is carried out for about 5 minutes in a chlorinating liquid adjusted to pH 7.2-9.0; preferably calcium hypochlorite in the presence of an alkali borate (sodium metaborate) is employed. Sulfuric acid or sodium bisulfite may be used in the acid pretreatment.

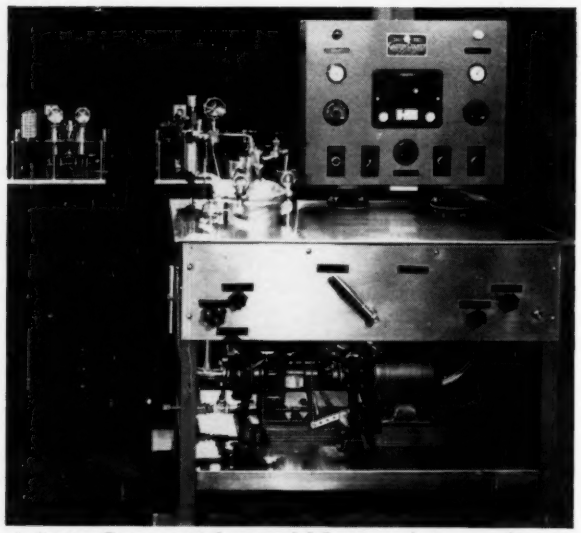
It appears that the excess acidity in the wool should be "desirably neutralized". This step eliminates unnecessary acidity in the bath but it does not neutralize all the acidity retained by the material itself. It has been found that the various types of wool (coarse and fine) adsorb acid at approximately the same amount, consequently blends of different fineness can be uniformly treated in this process.

A typical example calls for treating the goods at 130° F for 20 minutes in a bath containing acid sulfate and a wetting agent. After the bath is drawn off, the goods are drained but not rinsed and then introduced into a cold bath containing sodium metaborate, whereby a sufficient equilibrium between acid and metaborate is attained. They are next immersed in the chlorinating liquid, containing sodium metaborate and (separately dissolved) calcium hypochlorite. The final stage includes an antichlor (sodium bisulfite) and a warm-rinsing treatment.

The specific advantage of the present process seems to be that it allows controlled amounts of acid to be retained in the fibers. The alkali borates are used to release gradually the available chlorine.

It might be mentioned that similar methods are outlined in U S P 2,457,033 (Harris, Clapham), which suggests the chlorination of wool at a pH between 8 and 9, and the use of borax or other borate in the buffering of the solution. U S P 2,457,033 was published after the current patent application had been filed.

NEWS



A Gaston County stainless steel laboratory dyeing machine is shown in the foreground. In the rear are a model combination two-kier beam and package unit and a model package dyeing unit, both built by Gaston County on 1/10 scale.

• Gaston County Laboratory Dyeing Machine

Exhibit visitors at the recent AATCC Convention were able to view Gaston County Dyeing Machine Company's stainless steel laboratory dyeing machine, which was used in the experimental work on the new T-7 fibers at the Institute of Textile Technology and the Southern Regional Research Laboratory. The versatile unit is suitable for both conventional and high-temperature dyeing.

The machine is equipped with the following: an add-dye tank to permit adding while the unit is operating above 212°F; a visible top wash; a flow-control system for controlling dye liquor according to the type of yarns being processed; and a process timer. The dyeing kier, jacketed for indirect heating and cooling, is equipped with a combination dye spindle suitable for the dyeing of packages wound on 1⅝" as well as ⅝" tubes, 1⅝" springs, Barber-Colman cheeses, cones, and raw stock.

Other arrangements of the machine provide for steaming yarn both ways (from inside-out and from outside-in) and for automatic heating and cooling. It is automatically controlled as to temperature and dye liquor flow reversal and is furnished complete with all auxiliary piping for steam, and water and hand valves, so that it is only necessary to bring steam and water to the machine, and make the electrical connections to the starter. The top and front panels as well as the bottom plate are covered with stainless steel.

• Additional Exhibitors at Textile Machinery Exposition

Supplementing the list which appeared in our September 14th issue are the following firms which will exhibit at the American Textile Machinery Exhibition to be held during the week of April 26th-30th, 1954, in Atlantic City:

Askania Regulator Co (regulators)
Wright-Batchelder Corp (shepherd casters)
American Standard Fabricators Corp (dyeing and drying machinery)
Perfecting Service Co (rotary unions)
Rotherm Engineering Co, Inc (engineers)
The Holo-Krome Screw Corp (forged screws)
Armstrong Machine Works (steam traps)
Hartford Rayon Co (rayon)
Industrial Tape Corp has canceled their exhibit.

• New York Pigment Club Organizes

Representatives from seventeen pigment manufacturing concerns met on October 15th at the Kenmore Hall Hotel in New York to form the New York Pigment Club. Aaron Permut, Aula Chemicals, Inc, assumed the temporary chairmanship of the group and outlined the objectives of the club to the 31 persons attending.

Other temporary officers were chosen as follows:

Acting Secretary—Emil Wick, General Dyestuff Corporation

By-Laws Committeemen—R J O'Brien, Collway Colors, Inc, *chairman;* M Treade, Reichard-Coulston, Inc; and J Posetzner, Ansbacher-Siegle Corporation.

Program Committee — T D Mutaffis, General Aniline & Film Corporation, *chairman;* R A Stevens, C K Williams & Co; and P Thomasset, Thomasset Colors, Inc.

The new organization is a social-technical group whose professional interests lie in the same or similar fields. It is intended as a forum for discussing a) new scientific discoveries which pertain to pigments, b) new scientific developments in instrumentation which pertain to pigments; and c) news of educational opportunities; new books or industrial literature which pertain to pigments. Future meetings will be highlighted by papers presented by fundamental researchers, raw material suppliers, equipment manufacturers, educators and members of the organization.

The next meeting is scheduled for November 12th at the Kenmore Hall Hotel, 145 E 23rd St, New York, at which time a report will be made by the By-Laws Committee.

• N E Chemical Club to Meet

The fall meeting of the Chemical Club of New England will be held Tuesday, November 17th, in the Crystal Room of the Hotel Kenmore. Dinner will be served members and guests at 7:00 P M. Dan Donovan, purchasing agent of the Pepperell Mfg Co, will be the guest speaker. Mr Donovan is past president of the New England Association of Purchasing Agents and the past vice president of the National Association. He has also been active on the education committees of these Associations.

• MCA Semi-Annual Meeting

The Manufacturing Chemists' Association, Inc will hold its 1953 semi-annual meeting at the Waldorf-Astoria, New York, NY, on Tuesday, November 24, an all-day session for the discussion of industry problems.

John J McCloy, chairman of the board, Chase National Bank and former High Commissioner of Germany, will speak on various aspects of our foreign policy at the evening banquet.

R B Semple, Wyandotte Chemicals Corporation, heads a Program Committee consisting of Kenneth C Towe, American Cyanamid Company; E T Asplundh, Columbia-Southern Chemical Corporation; John A Sargent, Diamond Alkali Company; R L Murray, Hooker Electrochemical Company, and D S Frederick, Rohm & Haas Company.

William C Foster, MSA president, will open the general session at 10 AM, with an address, "MCA—Present and Future." Lionel D Edie of the Investment Counseling firm of Lionel D Edie & Company will also speak at the opening session on "Factors Affecting the Business Outlook." Monsanto Chemical Company's new film, "Decision for Chemistry" will be shown.

At 2:30 PM panel sessions will be held on Foreign Trade and the Tariff, Depreciation, and Research Correlation. At 4 PM panel sessions will include discussions of Antitrust Laws and Policy, and Plant Maintenance and Cost Reduction. A reception is scheduled for 5:45 PM. The banquet is scheduled for 7 PM.

• SAM Official Cites Instrumentation Applications as "Still in Diaper Stage"

The applications of electronic instrumentation to the many processing and atomic energy marvels of today are actually still in "the diaper stage", according to Kenneth Andersen, executive vice president, Scientific Apparatus Maker. Mr Anderson made the observation as he accepted commendations and praise for the industry at the Instrument Society of America's private exhibition luncheon held recently at the Sherman Hotel, Chicago, Ill.

Mr Andersen was acknowledging Illinois Institute of Technology's president John T Rettaliata's principal remarks of the occasion, "The Value of Instrumentation", opening the Eighth National Instrument Conference and Exhibit under the sponsorship of the Instrument Society of America.

Over 200 exhibitors occupied 34,000 sq ft of floor space at the event.

• Quebec Section, CATCC, Inaugurates 18th Session

The 18th session of the Quebec Section, Canadian Association of Textile Colourists and Chemists, began on October 17th with a meeting in the Lecture Theatre in the Physical Science Centre, McGill University, Montreal, Que, at which time J B Goldberg, textile consultant, spoke on "The Why and Wherefore of Blends". Prior to the general meeting, a new feature was introduced in the form of a number of study groups in the various classrooms. Subjects included "The Miracle Fibers", "What's New in Cotton", "Dyeing of Wool Blends", and "Modern Trends in Hosiery".

The theme of the 1953-54 session is "The Processing of Blends".

A syllabus for the remainder of the year follows:

Nov 15——"The Wet Processing and Dyeing Machinery for Blends"——H F Creegan, James Hunter Machine Co.

Dec 12——"The Dyeing of Blended Fibers and Fabrics"——Lawrence Thompson, General Dyestuff Corp.

Jan 16——"The Advantages of Blends in Decorative and Industrial Fabrics"——R D Bennett and Emile J Carrier

Feb 20——"The Dry-Finishing Equipment for Blended Fibers and Fabrics"——M T Fleming, Proctor & Schwartz Co Ltd.

Mar 20——"The Finishing of Blended Yarns and Fabrics"——Weldon G Helmus, Fair Lawn Finishing Co.

April 23-24——18th Annual Meeting. "Quality Control at Mill Level".

June 19——Annual Golf Tournament.

Plant visits will be held in conjunction with the November 15th and March 20th meetings.

• 265 Exhibit at ITME

The International Textile Machinery Exhibition, held last month in Manchester, England, attracted 265 exhibitors, about one-fifth of which were from non-British nations, including the United States. It was the largest such exhibition ever staged in Britain.

The main features of the dyeing and finishing section were the new materials used in machine construction and the newest developments in the automatic control of drives and processing conditions. A unit of the molten-metal system was shown in operation for the first time to the general public.

• Hercules Displays Mechanized Quality Control Systems

More than 30 representatives of America's leading chemical firms were guests of Hercules Powder Company's Mansfield (Mass) Plant on October 14th to see in action a unique mechanized quality control system.

The all-day tour of the plant began with talks by Hercules executives who described strain-cell weighing equipment and automatic controls for the production of high quality, uniform pentaerythritol at Mansfield. A tour of the plant and inspection of the controls in action followed.

All instruments used in the control system were manufactured by the Foxboro Company, Foxboro, Mass and the Baldwin Lima Hamilton Company, Eddystone, Pa. Engineers from both companies were present to provide technical information. Baldwin Lima Hamilton demonstrated, with a table model strain gage, the instrument's operation. Harry F Ahern, superintendent of the plant, was host to the group.

The results of this engineering reportedly have resulted in reproducibility, constant control of delicate chemical operations, and graphic records which have led to "absolute uniformity."

The visitors were invited by Hercules management to inspect the apparatus with a view to adapting it to other chemical operations in their respective companies.

• Celanese Construction Nearing Completion At Summit

Construction is nearing completion on a new pilot plant center of the Plastics Division of Celanese Corporation of America as an addition to the present facilities of the Summit, New Jersey, Research Laboratories. The construction reflects Company emphasis on expansion in the synthetic resin and polymer field.

Plans include the construction of a 50 by 100 foot open concrete slab and a tall 50 by 50 foot building. The slab will be used for the outdoor erection of "closed-system" continuous pilot units. The building will house those units which must be enclosed as well as control panels for the outdoor pilot plants. Building and slab construction will each stress ease of expansion to meet future needs.

The pilot plants will provide equipment for the program of the Process Engineering Section. The company plans to build experimental units for process and production research involving current Celanese plastics, such as polyesters, and new polymers.

• Automatic Home Launderability Program for New Apparel Fabrics

A program to promote the automatic home launderability of apparel made of new modern fabrics will be sponsored by Princeton Knitting Mills, Bendix Home Appliances Division of Avco Manufacturing Corporation, and a number of leading apparel manufacturers. Comprehensive national trade and consumer advertising will be used and augmented by retail level promotions. A basic part of the program calls for every garment made of the new fabrics to bear a Bendix seal of approval for launderability, granted only after satisfactory testing.

The new washable Princeton Knitting fabrics as used in a variety of wearing apparel were shown at a recent fashion show and featured materials of "Orlon" acrylic fiber and nylon as well as blends. Bendix cooperated with Princeton in fostering the construction of the garments including trim, padding and thread to achieve home-launderable apparel. Clothing will be identified when sold with hand tags of Princeton Knitting and Bendix.

Bendix has set up special laboratories for testing the automatic home launderability of the new fabrics at South Bend, Indiana. Textile and apparel industry representatives interested in the Bendix testing program can contact Miss Lee Ballard, consumer relations manager of the firm, at 23 Grove Street, New York 14, N. Y.

• NID Management Engineering Service

Drycleaners in the far west may avail themselves of the National Institute of Drycleaning's Management Engineering Service during the months of January and February, 1954, if they apply for it in time. While the service is available to member plants at all times, the Institute's field industrial engineer, William G Lesterick, will be in the far west during those two months. He has expressed a desire to make as many stops as possible with drycleaners desiring counsel on plant layout and other industrial engineering problems.

The service includes: 1) proposed rearrangement of equipment and plant layout so as to eliminate double handling and wasteful effort on the part of employees; 2) training aids with which to show employees how best to utilize the new layout; 3) a wage incentive program to give employees an opportunity to earn more as plant production increases; and 4) a study of the plant's operational costs as compared with those of other drycleaning establishments all over the country.

Drycleaners should write or wire the National Institute of Drycleaning, Silver Spring, Maryland.

• Avisco Expands Grants to Colleges

Sixteen fellowships and eighteen scholarships are being established for the coming scholastic year by American Viscose Corporation at a yearly cost exceeding $50,000, it is reported.

Six of the fellowships are in chemistry, six in textiles, and one each in dyeing, agriculture, forestry and accounting. The scholarships are divided among the fields of chemistry, chemical engineering, physics, business administration, textiles and accounting.

Through this program, the corporation is endeavoring to encourage young scientists, engineers and business administrators. In addition, it is designed to assist Avisco's general recruiting effort for college trained men.

• 2nd Chemical Sales Clinic

The chemical industry took another look into its sales problems and techniques last month as the Second Chemical Sales Clinic convened at the Hotel Commodore in New York. The Clinic is sponsored by the Salesmen's Association of the American Chemical Industry.

Keynoting the two-day program of prepared talks and floor discussion, John C Leppart, Mathieson Chemical Corp, discussed "Chemical Selling in Today's Economy" at the banquet on October 19th.

The broad relationships between management, the sales department and the individual salesman provided the themes for the opening session. Among the topics presented: "What Management Needs from the Sales Department," "What You, the Salesman, Need from Management," and "The Sales Department—Should It be Boss or Servant?".

An analysis of what goes into the making of a sales executive was made at the Monday luncheon, and was followed by an afternoon session given over to talks on technical and "in-company" training and a discussion of compensation plans for chemical salesmen.

The second day included talks on "Self-Evaluation for Salesmen," "The Role of the Distributor in Chemical Sales," "Imagination in Selling" and "A Purchasing Agent's View of Salesmen."

The final session was devoted to questions of sales costs and product development.

• APC Concludes Agreement With English Firm

American Polymer Corporation has announced the conclusion of a manufacturing license agreement with Scott Bader & Co, Ltd of Northants, England. This manufacturing license permits Scott Bader & Co to polymerize emulsions and solutions based on acrylic, vinyl, styrene, acrylonitrile and vinyl chloride monomers.

• Cyanamid Subsidiary to Build Titanium Plant

A new plant for the manufacture of titanium dioxide pigments will be built at Savannah, Georgia, by Chemical Construction Corp, a subsidiary of American Cyanamid Co. The new plant will represent the fourth major construction project currently being carried out in the South by Chemical Construction Co. Others are the Texas City, Texas, plant of Texas City Chemicals Co; the Nicholas, Fla, plant of the Virginia Carolina Chemical Co; and American Cyanamid's Fortier, La, operation.

The Savannah plant will be operated by the Calco Chemical Division, a major producer of titanium dioxide white pigments.

• CCNE Fall Outing

The Chemical Club of New England held its fall outing at Coonamessett Ranch Inn, North Falmouth, Massachusetts, on Thursday, October 1st. Members and guests gathered at the Inn for dinner on Wednesday, and remained for a full day of golf and fishing on Thursday, leaving the next morning after breakfast. Frank Kotteck, Bersworth Chemical Co, and William Mann, Geo Mann & Co Inc, had their boats moored nearby for fishing parties. President Richardson continued the precedent set several years ago and provided the "Presidents' Folly", a cocktail party given by him at the close of the day's golf and fishing. The affair was in charge of Gordon Mulligan of the entertainment committee. In addition to many door prizes, awards were made to the following golfers:

First low gross———A J Gard
Second low gross——J Farley
Third low gross——H Milton
Low net———C T Zackrison
Second low net———C P Seaverns
Third low net———D O'Connell

The prize for catching the biggest fish went to Jack Marshall.

• Ansul Begins Production on Synthetic Pyridines

Ansul Chemical Company, Marinette, Wisconsin, has begun the production of synthetic pyridines, including several hundred thousand pounds of refined pyridine, alpha picoline, gamma picoline, 2-methyl, 5-ethyl pyridine, beta collidine, and a mixture of alkyl pyridine high boilers. For the last six months the company has distributed limited plant samples.

Ansul pyridines will be available in one- and five-gallon cans and 55-gallon drums at competitive prices.

• Emery Expands Dimer Acid Production

Emery Industries, Inc, Cincinnati, is expanding facilities for the production of Dimer Acid, an unusual long-chain dibasic acid. It is stated that improvements in processing methods will produce a lighter colored product. According to Emery's evaluation against current production, all other characteristics of the improved product will remain unchanged.

According to Robert F Brown, sales manager of Emery's Chemical Division, the new production will be designated "Empol 1022 Polymerized Fatty Acid" to avoid possible confusion with other unrelated "dimers".

Full scale production of Empol 1022 is anticipated for early in December. Shortly thereafter, Empol 1022 will replace completely the present Emery 955 Dimer Acid.

Limited quantities of Empol 1022 are now available for experimental work.

• GDGA Establishes Speakers Bureau

The Garment Dyers Guild of America has formed a speakers bureau which will provide men to appear at local meetings of drycleaners associations. Most of the members of the Guild are making themselves available for this service and all requests will be cleared through the headquarters in Chicago.

The talks will be built around the technical aspects of dyeing and will describe helpful procedures in the cleaners' handing of this service.

There will be no charge for this service. Inquiries should be addressed to Executive Secretary Allan J Copeland, 520 N Michigan Avenue, Chicago 11, Ill.

• Hooker Annual Sales Meeting

Hooker Electrochemical Company held its Annual Sales Meeting last month at its main sales office in Niagara Falls. Present for the three-day meeting were all field salesmen, supervisors, district managers and personnel of the local office, in addition to representatives from the branch offices in New York, Chicago, Tacoma and Los Angeles, as well as Hooker's newly acquired subsidiary selling agency, the Marble-Nye Company of Worcester, Mass.

Chairmen for the various sessions scheduled were Robert E Wilkin, vice president and general sales manager; John S Coey, Eastern sales manager; Thonet C Dauphiné, manager of sales development; James S Walker, manager of technical sales service; Bjarne Klaussen, executive vice president, and William H Monsson, caustic-chlorine sales supervisor.

• New Committee Organizes Under Auspices of ASA

Better service from institutional textiles is the objective of a committee which met for the first time on October 7 at the headquarters of the American Standards Association, 70 East 45 Street, New York, N Y.

The committee met under the auspices of the ASA to organize five technical subcommittees to consider institutional furnishings, utility textiles, uniforms, work clothes, and administrative work.

Organizations not already represented on the committee were invited to send representatives to consider products in which they are interested.

Clifford R Gillam, general manager, Buck Hill Falls Company, representing the American Hotels Association, is chairman of the committee.

• Koppers to Add New Building at Verona Research Center

Koppers Company, Inc, Pittsburgh, Pa, has purchased approximately two acres of land directly east of its present Research Center at Verona, Pa, and will start at once to erect additional research facilities, primarily for its Tar Products Division.

Fred C Foy, Vice President and General Manager, Tar Products Division, states that a one-story building, approximately 80 by 160 feet will be completed by late Spring of next year to house service and testing laboratories of the Division. Approximately 40 employees will then have offices there, moving from present rented quarters in Pittsburgh.

The new building at the Research Center will be of cement block construction. A contract for its erection will be let shortly.

Koppers Verona Research Center now employs 180 persons. With the additional Tar Products Division personnel, approximately 225 persons will be employed there.

• DCAT Hears Optimstic Message at Annual Meeting

J Carvel Lange, president of the Industrial Commodity Corporation, sounded an optimistic note in his address, "A Look at Business for 1954", at the 63rd Annual Meeting of the Drug, Chemical and Allied Trades Section last month at Pocono Manor, Pa.

Mr Lange was the main speaker at the Section's business session, which also featured reports by officers and committee chairmen and the election of a new Executive Committee.

• Textile Lecture Course

A new textile lecture course "Essentials of Textile Production and Distribution", under the auspices of the Institute of Arts and Sciences, Columbia University, began on October 5th with the first of a series of Monday night lectures at the Barbizon Plaza Theatre, 101 W 58th Street, New York.

The course is unique in its scope, covering such subjects as: Retail Selling and Promotion; Textile Promotion; Textile Advertising Media; Trade Rules and Regulations; Retail, Chain Store, Mail Order Buying; Government Procurement; Service Industries; Labeling; Garment Manufacture; Fashion and Fashion Coordination; The Converting Industry; Dyeing, Printing and Finishing; Dyestuffs; Quality Control Testing for Mill, Finisher and Consumer; Yarn Manufacturing; Knitting; Fabric Designing; Weaving; Natural and Synthetic Fibers; Textile Financing; Textile Law and Arbitration; Statistics, Economics, Market Analysis; World Fiber Picture.

Program Chairman W E Coughlin, Director of Consumer Services, Celanese Corporation of America, has coordinated the subject matter of the lectures in order to emphasize the responsibilities of the various branches of the industry to each other and to the consumer. Guest lecturers of outstanding ability have accepted invitations to participate. One of the purposes of the program is to make available for the first time a comprehensive study of all the major operations of the textile industry, a course that the industry—the nation's second largest—has felt the need of for many years.

An industry-wide Advisory Committee, composed of 85 prominent textile leaders under the General Chairmanship of Harry Riemer, Editor, Daily News Record, has been active for nearly a year in assisting Columbia University to formulate the present content of the series. Among those serving on the committee, many of whom will also serve as guest lecturers, are the following: W Ray Bell, president, The Association of Cotton Textile Merchants of New York; J Robert Bonnar, technical director, General Dyestuff Corporation; J E Bradley, vice-president, Pacific Mills; Charles W Carvin, Charles W Carvin Company Incorporated; Marvin R Cross, president, Greenwood Mills, Inc; Charles W Dorn, director, Research Laboratory, J C Penney Co Inc; George Greenspan, Cantor-Greenspan Company, Inc; J Spencer Love, Burlington Mills Corporation; Leon Lowenstein, M Lowenstein & Sons, Inc; Walter Ross, Rosewood Fabrics; J P Stevens, Jr, J P Stevens Co, Inc; Donald Tansill, vice-president, M Lowenstein & Sons, Inc; Edwin Wilkinson, exec vice-president, National Association of Wool Manufacturers.

NAMES IN THE NEWS

C H Garren

THE appointment of two new technical sales representatives to work with the corrugating and textile industries has been announced by the industrial sales department of the A E Staley Manufacturing Co, Decatur, Illinois.

CRAWFORD H GARREN has been employed as a textile representative working under the supervision of the Staley company's Atlanta office. He was formerly a sales representative with Stein, Hall and Co.

JACK W ROSE has been appointed a technical representative in the Chicago sales office to work with the corrugating industry. He was formerly employed by the Bio Process Co, Joliet, Illinois.

RALPH E FLANDERS, senior senator from Vermont, was awarded the 1953 Howard Coonley Medal at the annual award luncheon meeting of the American Standards Association on October 21st "for service in advancing the national economy through voluntary standards."

The award, the fourth of its kind, represents highest achievement in the field of standardization.

COLONEL PERRY L HOUSER, general supervisor, manufacturing standards research, International Harvester Co, Chicago, was awarded the Standards medal for leadership in the actual development and application of standards.

ALBERT M NORDT has been appointed to head the Purchasing Department of the Glyco Products Co, Inc, Brooklyn, N Y and Williamsport, Pa.

Mr Nordt has had more than twenty years experience in purchasing chemical and allied products. He previously acted in a similar capacity with Rosenthal Bercow Co, Biddle Sawyer Corp and Cole Laboratories, Inc.

R J Carey

RAYMOND J CAREY, regional representative for General Dyestuff Corporation in Western Connecticut, New York and New Jersey, recently returned from a 7-day National Resources Conference in Boston under the auspices of the Industrial College of the Armed Forces. The conference was a condensation of the resident 10-month course.

LAWRENCE H BRUCE, technical representative for the latex and aqueous dispersions group of the Naugatuck Chemical Division, United States Rubber Co, has been assigned to Akron, Ohio, effectime immediately.

Mr Bruce, who has been assistant technical sales representative in the New York and New Jersey area, has been associated with Naugatuck Chemical for approximately 11 years. In his new post he will make his headquarters at 247 East Exchange Street, Akron.

MARK A MINATELLI is back at his old job with American Viscose Corporation as Textile Research Department representative for Central and South America.

Mr Minatelli, who joined American Viscose Corporation in May, 1945, resigned two years ago to manage the Textilera Mayabeque, S A, plant at Guines, Cuba.

As in the past, Mr Minatelli will make his headquarters in Marcus Hook, but will spend three to four months each year visiting the corporation's customers and prospective customers in Latin America.

THE Glycerine Producers' Association has announced the names of the judges for the 1953 Glycerine Research Awards competition. They are: WALTER J MURPHY, *Chemical & Engineering News;* MORRIS EMBREE, Distillation Products Corp; and W C AULT, Eastern Regional Research Laboratories, United States Department of Agriculture.

R R Estes

RRAY ESTES has been added to the research staff of Emery Industries, Inc, Cincinnati, O, where he will be connected with the New Chemicals Department under the immediate direction of C GOEBELS.

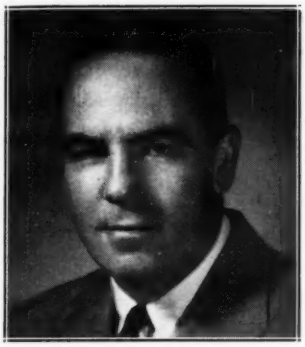
Dr Estes comes to Emery from the University of Kentucky where he has been assistant professor in chemistry and director of research for the past seven years. Prior to that, he was associated with Armour Laboratories, University of Texas and Emory University.

THE appointment of RAYMOND W McNAMEE as manager of research administration of Union Carbide and Carbon Corporation has been announced. Dr McNamee will help co-ordinate the research activities of all of the Corporation laboratories.

Dr McNamee joined the Corporation's chemical research organization at South Charleston, W Va, in 1933 and, since 1950, has been superintendent of the Research and Development Department of Carbide and Carbon Chemicals Company, a Division of Union Carbide. Dr McNamee, this year's winner of the Herty Medal of the American Chemical Society for "outstanding contributions to chemistry in the Southeast", has played a prominent part in the industrial research on large-scale production processes for styrene, ethylene oxide, and allethrin.

His successor, FRANKLIN JOHNSTON, joined Carbide and Carbon Chemicals Company in 1933. As Superintendent of the Research and Development Department, he will be in charge of the Company's Research Center at South Charleston.

Coincident with the advancement of Dr Johnston was the appointment of HENRY C CHITWOOD, former research group leader, to the position of assistant director of research——organic chemicals. Dr Chitwood joined Carbide and Carbon Chemicals Company in 1934.



A R Loosli

ALDEN R LOOSLI has been named manager of the newly formed Market Research and Development Department, Calco Chemical Division, American Cyanamid Company, Bound Brook, N J. Mr Loosli will also continue in his present post of assistant to the general manager.

The new department, which will include the existing Market Research Department, will conduct market surveys and make economic studies for new products and their uses and proposed expansion of established products, and promote initial sales of new products requiring market exploration. WILEY W CARR will continue in his position of manager of the market research section of the new department.

Cyanamid has also announced the appointments of C B E ROSANE as comptroller, and DUNCAN EDWARDS, JR and ERNEST G HESSE as assistant treasurers.

Mr Rosane, who has been assistant treasurer with Cyanamid for the past 14 years, was treasurer of the Calco Chemical Company from 1929-1939, when it became a Cyanamid Division. Mr Edwards has been in Cyanamid's Treasurer's Department since 1950 when he joined the firm, and Mr Hesse was manager of foreign accounting before this latest appointment.

PAUL F HOPPER replaces WILBUR MILLER as Cyanamid's governmental technical service representative in Washington, where he will assist in the exchange of information between Cyanamid's scientific staff and the various government agencies. Mr Miller has been made director of custom sales for the Company's Lederle Laboratories Division.

WILLIAM M STAPLES has been named to the post of manager of construction by Chemical Construction Corporation, a Cyanamid unit that designs and builds chemical plants throughout the world. With Mr Staples' promotion to this post, the firm will place increasing emphasis on contracts for plants engineered, constructed and placed in operation with its own forces on a "single" contract basis. Formerly, responsibility for construction and initial operation of new plants was handled by HAROLD E BROUGHTON, who became a consultant to the firm following his recent retirement.

INDUSTRIAL RAYON CORPORATION has announced the appointment of JOHN H GREEN, JR, to the position of supervisor of the company's central laboratory in Cleveland. He previously was senior chemist attached to the plant manager's staff at Covington, Va.

OTTO F HABEL, Manager of the Textile Printing Department, General Dyestuff Corporation, accepted the invitation of The Society of Dyers and Colorists to present a paper at a symposium on textile printing held recently at St Anns-by-the-Sea, Lancashire, England.

The meeting was attended by leading chemists from many countries including Switzerland, France, Germany, United States and England. Mr Habel's paper, entitled "Observations on Textile Printing in the U S A" covered methods used by the textile printing industry in this country with particular emphasis on the more recent developments on the newer synthetics. It also dealt with our modern high-speed production methods and included references to hand block and spray printing as well as machine and screen printing.

Mr Habel brought with him the greetings of the A A T C C and its president, J Robert Bonnar.

Mr Habel has been associated with GDC for over 25 years.

THE appointment of RICHARD S COX as Dean Emeritus at the Philadelphia Textile Institute was announced on September 21st by Bertrand W Hayward, Director of the college.

Because of his pressing duties as treasurer and executive Secretary of The Philadelphia Textile Institute Foundation, Dr Cox will now give his full time services with this nonprofit organization, which is currently conducting a five-million dollar development fund program for the Institute. Dr Cox celebrated his 75th birthday in August and has been with the Institute for 54 years.

Coinciding with this appointment is the creation of two new posts at the Institute. A WARD FRANCE, former head of the wool department and dean of the evening school, becomes the new dean of faculty. DONALD B PARTRIDGE, former director of admissions and placement becomes the new dean of students.

R M Stotsenburg

R M STOTSENBURG has been named sales manager of the Fielden Instrument Division, Robertshaw-Fulton Controls Co, Philadelphia, Pa. Prior to joining Fielden, Mr Stotsenburg was with RCA Victor Division, Camden, N J, for ten years.

STANLEY I CLARK, Vice-President, Sterling Drug, Inc, was elected Chairman of the Drug, Chemical and Allied Trades Section of the New York Board of Trade (DCAT) at its 63rd Annual Meeting. Other officers who will serve during the next fiscal year are: *Vice Chairman*——CLAUDE A HANFORD, Pharmaco, Inc, *Treasurer*——HUGH S CROSSON, McKesson & Robbins, Inc, *Secretary*——HELEN L BOOTH. JAMES G FLANAGAN, S B Penick & Co, was reappointed Counsel.

The DCAT, composed of over 750 leading manufacturers and distributors of drug chemicals and related products, met at Pocono Manor Inn, Pocono Manor, Pa, September 24-26. The retiring Chairman, LLOYD I VOLCKENING, The Ivers-Lee Company, was elected Section Representative to the Board of Directors of the New York Board of Trade.

The personnel of the newly elected Executive Committee (exclusive of officers) follows:

Ralph A Clark, J T Baker Chemical Co; Harold F Cummings, Vitamerican Oil Corp; Donald S Cushman; Leonard Dalsemer, The Lord Baltimore Press; James Day, Dow Chemical Co; Dudley Dunlop, Mallinkrodt Chemical Works; J David Hayden, R P Scherer Corp; William W Huisking Chas L Huisking & Co, Inc; George S McMillan, Bristol-Myers Co; W Boyd O'Connor, Ayerst, McKenna & Harrison, Ltd; W M Russell, Monsanto Chemical Co; Wm J Schieffelin, III, Schieffelin & Co; F M Schwemmer, Ruthrauff & Ryan, Inc; Fred G Singer, E I du Pont de Nemours & Co, Inc; Sydney N Stokes, Merck & Company, Inc; and Stephen F Urban. E R Squibb & Sons.

JOHN W McCALLA, formerly with Rock Hill Printing and Finishing Company and Interchemical Company, has joined the Sales Department of the Augusta Chemical Co, Augusta, Ga. Mr McCalla will represent his new firm in the Carolinas and Virginia.

RESORCINOL BOOKLET C-3-176

Koppers Company
Chemical Division
Pittsburgh 19, Pa
16 pages

Among the many finished products in whose manufacture resorcinol plays an important part, this booklet cites the use of the intermediate in textile and fur dyes.

Included is brief historical background information concerning the chemical as well as technical data including specifications and properties of commercial interest.

FABRIC FACTS FOR FALL 1953

Fabric Department
Women's Wear Daily
7 East 12 St, New York 3, N Y
79 pages; 25c a copy

This 6" x 3" pamphlet contains definitions of synthetics, finishes, dyes, and weaves being shown this season. A new feature of this edition is the listing of all items in alphabetical order.

PB 111144, MECHANICS OF ELASTIC PERFORMANCE ON TEXTILE MATERIALS: RELATIONS OF FIBER PROPERTIES AND FABRIC STRUCTURE TO CREASE RESISTACE

Office of Technical Services
U S Department of Commerce
Washington 25, D C
Mimeo $2.25 (enclose check or money order payable to the Treasurer of the Ufited States)
81 pages, including diagrams, graphs and tables

Just what will promote recovery in fabrics when bent and creased is the main subject of a series of tests conducted on the relationship of fabric structure to crease resistance and prepared by the Research and Development Division of the Quartermaster Corps and the Office of Naval Research.

Experiments conducted in the Research and Development laboratories indicate that high immediate elastic deflection at low average tensile strains is an important factor in recovery from creasing, and that construction variations which decrease the state of strain in fibers and yarns when a fabric is bent will promote recovery from creasing. The precise results of experiments conducted with different types of fabrics and fibers are fully discussed and illustrated.

The scientists conducting these tests conclude that, although the precise numerical effect of changes in construction cannot be exactly predicted at this stage in their experimentation, reductions in rigidity and increases in the opportunity for buckling, accomplished by the use of fabrics having long floats, will create fabrics with greater crease recover.

The report includes a list of additional references on fabric elasticity and wrinkleproofing.

TECHNICAL LITERATURE

(Unless otherwise noted, the following trade literature may be obtained free of charge by writing on business letterhead to the address indicated.)

METALLIZING

Protective Coatings Division
Metalweld, Inc
Scotts Lane & Abbotsford Ave
Philadelphia, Pa
4 pages; 2-color; illustrated

Application of uses for and benefits to be obtained with metallizing are outlined. Included is a section entitled "What the metallizing process can do for you." The process itself is described and data on a new spraying technique presented.

AUTOMATIC pH CONTROL IN WATER AND INDUSTRIAL WASTE TREATMENT

Milton Roy Company
Station E
1300 E Mermaid Lane
Philadelphia 18, Pa

This bulletin (No. 55) is a reprint of a paper delivered by R T Sheen, president of the company. Outlined are several typical systems of automatic pH control in boiler feed water treatment using air- and motor-operated valves as well as controlled volume pumps to effect proper addition of chemicals. Several diagrams of actual installations are included.

TEKTOLOG ELECTRONIC RECORDER

Fielden Instrument Division
Robertshaw-Fulton Controls Co
2920 N Fourth Street
Philadelphia 33, Pa
8 pages

Tektolog features of simplified design, accuracy to ± 1% of full scale, and self-starting operation from low energy sources are fully described.

TERGITOL DISPERSANT NPX

Carbide and Carbon Chemicals Company
30 East 42nd Street
New York 17, N Y

F-8156 covers this nonionic surface-active agent, which is said to have outstanding detergent, dispersing, and emulsifying properties. In textile processing, the product is finding particular application in scouring and wetting operations.

The bulletin includes information on physical properties, shipping data, solubility characteristics, wetting power, stability and compatibility, physiological action, and application. Many suggested formulations are given.

HOUGHTO—SIZE 475

E F Houghton & Co
303 W Lehigh Ave
Philadelphia 33, Pa

This bulletin describes fully Houghton's dry, powdered sizing compound for cotton and synthetic warps. Introduced in late 1951, Houghto-Size 475 is said to provide for easier handling and more accuracy in preparation, good binding, reduced shedding and improved efficiency in slashing and weaving.

CARBOWAX POLYETHYLENE GLYCOLS

Carbide and Carbon Chemicals Company
30 East 42nd St, New York 17, N Y

The properties of water-solubility and nonvolatility have led many industries to utilize the Carbowax polyethylene glycols. The textile industry finds them of value as softeners and lubricants for all kinds of fibers. Ask for catalog F-4772.

THE CHEMISTRY OF CYANURIC CHLORIDE

Manufacturer's Chemicals Dept
Industrial Chemicals Division
American Cyanamid Company
30 Rockefeller Plaza
New York 20, N Y
27 pages

STARCHES WITH AMAZING VERSATILITY FOR EVERY TEXTILE OPERATION

National Starch Products Inc
270 Madison Ave, New York 16, N Y

This leaflet lists the types, uses and principle characteristics of National's textile starches. It describes 26 special purpose starches in all for warp sizing, finshing and printing.

Among those covered: a new noncongealing, waxy maize starch for finishing, containing all amylopectin (for clear, colorless solutions and strong, smooth films); a new cold-water swelling printing thickener, prepared by adding to cold water with agitation; and a size for cotton, spun rayon and worsteds that can be applied at room temperature.

AVCOSET CONTROLS RAYON SHRINKAGE FOR THE LIFE OF THE FABRIC

American Viscose Corporation
350 Fifth Avenue
New York 1, N Y
14 pages

The devlopment of Avcoset (American Viscose Corporation's finishing process for rayon)—how it happened; how Avcoset works; findings of Avisco's textile research staff; answers to typical questions on Avcoset; minimum requirements for Avcoset identification; what Avcoset will mean to the industry at large.